

Join us! In an effort to enhance meetings post COVID-19 emergency orders, the City Council invites you to join and/or participate in a variety of ways: Via computer Zoom meetings (no app is necessary), telephone, email and/or text! See details on page 3.

**Vestavia Hills
City Council Agenda
May 23 2022
6:00 PM**

1. Call to Order
2. Roll Call
3. Invocation – Steve Dedmon, Vestavia Hills Chaplain
4. Pledge Of Allegiance
5. Approval Of The Agenda
6. Announcements, Candidates and Guest Recognition
7. Certificate Of Recognition – Donald Harwell
8. City Manager’s Report
9. Councilors’ Reports
10. Financial Reports – Melvin Turner, III, Finance Director
11. Infrastructure And Community Spaces Update – Raynor Boles, TCU
12. Approval Of Minutes – May 9, 2022 (Work Session) And May 9, 2022 (Regular Meeting)

Old Business

13. Public Hearing – Resolution Number 5389 – A Resolution Authorizing The City Manager To Expend Additional Funding For Final Designs On Proposed Intersection Improvements At Sicard Hollow Road And Blue Lake Drive And To Authorize The City Manager To Accept A Proposal With Sain Associates To Provide Said Supplement Design Services
14. Public Hearing – Ordinance Number 3098 – Rezoning And Conditional Use Approval – 4538 Pine Tree Circle; Lot 43, Topfield Subdivision; Request To Rezone From Vestavia Hills R-1 To Vestavia Hills B-3 With A Conditional Use For Use As A Veterinary Clinic, Grooming And/Or Boarding Of Dogs
15. Public Hearing – Ordinance Number 3099 – An Ordinance Repealing Ordinance Number 2331, 2331-A, And 2331-B And Establishing A New Vestavia Hills Zoning Code

New Business

New Business (Requesting Unanimous Consent)

First Reading (No Action To Be Taken At This Meeting)

16. Citizens Comments
17. Time Of Adjournment

SPECIAL NOTICE CONCERNING CITY COUNCIL MEETINGS

Due to the COVID-19 safety advice given by the ADPH, the City Council work sessions and meetings are available via video-conference and teleconference. If you choose not to attend in person, you may still participate. Following are instructions for three options to participate remotely.

COMPUTER PARTICIPATION (view/participate in real time)

To participate in by videoconference, click <https://us02web.zoom.us/j/5539517181>. When the Zoom.us window opens in your browser, click “Allow” so that the page may open to a waiting room. The host will open the meeting and bring all into the meeting room at that time. All participants will be automatically muted upon entrance to the meeting. If you wish to speak during time(s) identified for public input, activate the “Raise Hand” feature and unmute yourself by toggling the mute button. When the Mayor recognizes you and gives you the floor, state your name and address for the record and then you may address the Council.

Using the icons on the Zoom screen, you can:

- Mute/unmute your microphone (far left)
- Turn on/off camera (“Start/Stop Video”)
- View Participants – opens a pop-out screen that includes the “Raise Hand” icon that you may use to raise a virtual hand
- Change your screen name displayed in the participant list and video window
- Toggle between “speaker” and “gallery” views – “Speaker view” shows the active speaker; “Gallery view” tiles all of the meeting participants

TELEPHONE PARTICIPATION (view/participate in real time)

To participate by telephone, dial 312.626.6799 and enter the meeting ID: 455 534 3275. All participants will be automatically muted upon entrance to the meeting. If you wish to speak during time(s) identified for public input, press *6 on your phone keypad to unmute yourself. Then state your name and wait for the Mayor to recognize you. When the Mayor recognizes you and gives you the floor, state your name and address for the record and then address the Council.

TEXT AND/OR EMAIL (prior to the meeting or in real time)

If you do not wish to join the meeting but would like to ask a question or make a statement regarding an item on the agenda, you may email the City Council directly at City.Council@vhal.org. You may also text your question/statement to City Council at 205.517.1370. Both of these options are available prior to and during each work session and meeting. Be sure to provide your name and address for the record and your comments will be recited to the City Council as the corresponding item is being addressed. Note: As a matter of record, your name and address are required. If identification is not provided, your comment/question will not be presented.



City of
VESTAVIA HILLS

IN APPRECIATION

On behalf of the City of Vestavia Hills, it is with great pleasure that I present to

DONALD HARWELL

this Certificate of Appreciation for your service on the Birmingham-Jefferson County Transit Authority Board. BJCTA board members have a long-standing tradition of working diligently to support services that contribute to the overall welfare of the residents of their communities. We are grateful for your contribution of service in this endeavor for the City of Vestavia Hills.

Civic engagement of our many volunteers is vital to assure a high quality of life in our City and the Mayor, City Council and Vestavia Hills residents deeply appreciate your dedication to this organization. We wish you much success in the future.

IN WITNESS WHEREOF, I have
hereunto set my hand and caused the
Seal of the City of Vestavia Hills to be
affixed this the 23rd day of May 2022.

Ashley C. Curry, Mayor

CITY OF VESTAVIA HILLS

WORK SESSION

MAY 9, 2022

The City Council met in special work session on this date following posting/publication as required by Alabama law. The Mayor Pro-Tem called the work session to order and the Clerk called the roll:

MEMBERS PRESENT: Rusty Weaver, Mayor Pro-Tem
Kimberly Cook, Councilor
Paul Head, Councilor
George Pierce, Councilor

MEMBERS ABSENT: Ashley C. Curry, Mayor

OTHER OFFICIALS PRESENT: Jeff Downes, City Manager
Patrick Boone, City Attorney
Rebecca Leavings, City Clerk

EXECUTIVE SESSION

The Mayor Pro-Tem opened the Work Session and indicated that the Council needed to move into Executive Session for discussion involving the possible purchase or sale of real estate for an estimated 50 minutes. He opened the floor for a motion:

MOTION Motion to enter into Executive Session for an estimated 50 minutes for discussion of the possible purchase/sale of real estates was by Mrs. Cook, seconded by Mr. Pierce. Mr. Weaver asked the City Attorney if the Council could go into executive session for such a purpose. Mr. Boone said this is allowed under state law.

as follows:

Mrs. Cook – yes

Mr. Head – yes

Mr. Pierce – yes

Mr. Weaver – yes

Motion carried.

At 5:02 PM, the Council exited the Chamber and entered into Executive Session. At 5:52 PM, the Council re-entered the Chambers and exited Executive Session.

The Mayor Pro-Tem called the Work Session back to order at 5:53 PM.

There being no further business, Mrs. Cook made the motion to adjourn. The Work Session adjourned at 5:55 PM.

Rusty Weaver
Mayor Pro-Tem

ATTESTED BY:

Rebecca Leavings
City Clerk

. CITY OF VESTAVIA HILLS

CITY COUNCIL

MINUTES

MAY 9, 2022

The City Council of Vestavia Hills met in regular session on this date at 6:00 PM, following publication and posting pursuant to Alabama law. A number of staff and members of the general public also attended virtually, via Zoom.com, following publication pursuant to Alabama law. The Mayor attended virtually, therefore, the Mayor Pro-Tem chaired the meeting. The Mayor Pro-Tem called the meeting to order. The City Clerk called the roll with the following:

MEMBERS PRESENT:

Rusty Weaver, Mayor Pro-Tem
Kimberly Cook, Councilor
Paul Head, Councilor*
George Pierce, Councilor
Mayor Ashley C. Curry*

OTHER OFFICIALS PRESENT:

Jeff Downes, City Manager
Patrick Boone, City Attorney
Rebecca Leavings, City Clerk
Ryan Farrell, Asst. Fire Chief
Jason Hardin, Deputy Police Chief
Melvin Turner, Finance Director
Zach Clifton, Chief Accountant
Brian Davis, Public Services Director
Christopher Brady, City Engineer
Cinnamon McCulley*

**present virtually via Zoom or telephone*

Don Richards, Vestavia Hills Chaplain, led the invocation which was followed by the Pledge of Allegiance.

APPROVAL OF THE AGENDA

The Mayor Pro-Tem opened the floor for a motion of approval of the agenda as presented.

MOTION Motion to approve the agenda as presented was by Mr. Pierce seconded by Mrs. Cook. Roll call vote was, as follows:

Mrs. Cook – yes	Mr. Head – yes
Mr. Pierce – yes	Mayor Curry – yes
Mr. Weaver – yes	motion carried.

ANNOUNCEMENTS, CANDIDATES, GUEST RECOGNITION

- Mr. Pierce recognized Chris Davis who was present representing the Vestavia Hills Chamber of Commerce Board.
- Mr. Head announced that the next Parks and Recreation meeting will be held next Tuesday, May 17, 2022, in the ECR beginning at 7 AM.

PROCLAMATION

The Mayor Pro-Tem presented a Proclamation designating the week of May 9-15, 2022 as “National Police Week” and May 15, 2022 as “Peace Officers Memorial Day.” Mr. Downes read the Proclamation aloud and Mr. Pierce presented it to law enforcement officers, stating that this is just a small thank you for the work that the VHPD does. He thanked them for all they do for Vestavia Hills. Mr. Pierce presented it to the following officers: Lt. Joe Dease, Sgt. Cory Sauvant, Officer Tyler Gamble, Officer Morgan Riddlesburger, Officer Casey Barnes, Officer Ryan Shealy and Officer Christian Hubbard.

PROCLAMATION

The Mayor Pro-Tem presented a Proclamation designating the week of May 15-21, 2022 as “National Public Works Week.” Mr. Downes read the proclamation aloud and the Mr. Pierce presented it to Brian Davis, Public Services Director, Christopher Brady, City Engineer, and Public Works employees Jeff Clanton and Ronald Jackson.

Mr. Pierce stated that during difficult weather situations these guys go out in all kinds of weather and do their duties to clean up after storms. He thanked them for the work that they do.

CITY MANAGER’S REPORT

- Hazardous Waste Collection day will be held on May 15th at the Sicard Hollow Athletic Complex. Details may be found on the City website.
- Mr. Downes announced the celebration of the 20th anniversary of the annexation of Cahaba Heights. The Cahaba Heights Merchants Association (CHMA), the Chamber of Commerce, and the City will come together to celebrate for this special occasion May 20.
- Mr. Downes stated that the owner of the new Cajun Steamer restaurant and the CHMA have requested that the entertainment district be extended to cover the location of the Cajun Steamer. He showed the location of the proposed district changes. He stated that this increase proposed area is still within the allowances for an entertainment district. He stated that the City will seek public input on the topic before presenting to the Council.
- Mr. Downes noted there is a first read tonight to fund the engineering design for a roundabout at the intersection of Blue Lake and Sicard Hollow Road. He stated that this is adjacent to BWB property and the Council, in annual strategic planning, highlighted

this area as an important intersection to improve safety. The City received an APPLE grant which paid for the preliminary study which warranted a round-about. The Council discussed how this might impact the future development that might occur in Liberty Park. A supplemental study followed with the same recommendation. He stated that the estimated cost of construction is \$2 million. The City subsequently reached out to the Birmingham Water Works Board and gained their support for right-of-way access. Since the intersection is shared jurisdiction with Jefferson County, Jefferson County offered to pay half of the estimated \$2 million if the City paid the design costs. He explained that this first-read item is to fund the final engineering and design of this round-about so the project can go to bid.

- Mrs. Cook asked about the traffic study and the information from Sain. She requested that information be added to the agenda packet.
- Mr. Pierce stated that he feels something needs to be done but is concerned that there might be a better way to spend the required \$1 million.
- Mrs. Cook stated that she has followed this closely as this intersection is utilized by a number of Liberty Park high school students driving to school. She stated that the Bray in Liberty Park will also create more traffic at this junction due to the spine road connecting at Sicard Hollow Road. She stated that part of providing adequate infrastructure for the Bray development is improving this intersection. She stated she has received many complaints about the safety of this intersection and has, herself, observed how dangerous it is to pull out at high-traffic times.

COUNCILOR REPORTS

- Mr. Pierce that that he will be attending the Chamber Luncheon tomorrow and that Allen Green, Athletic Director for Auburn University, will be the keynote speaker.

APPROVAL OF MINUTES

The Mayor Pro-Tem stated that the approval of the April 19 & 20, 2022 (Work Session) And April 25, 2022 (Regular Meeting) was needed and opened the floor for a motion.

MOTION Motion to approve the minutes of the April 19 & 20, 2022 (Work Session) And April 25, 2022 (Regular Meeting) was made by Mrs. Cook and second was by Mr. Pierce. Roll call vote as follows:

Mrs. Cook – yes

Mr. Head – yes

Mr. Pierce – yes

Mayor Curry – yes

Mr. Weaver – yes

motion carried.

OLD BUSINESS

NEW BUSINESS

RESOLUTION NUMBER 5388

Resolution Number 5388 – A Resolution To Appoint A Member To The Birmingham-Jefferson County Transit Authority

MOTION Motion to approve Resolution Number 5388 was by Mrs. Cook and seconded by Mr. Pierce.

Mr. Weaver stated that the Mayor has recommended the appointment of Paige Coker. He thanked Donald Harwell for his service on this Board for the past 6 years.

There being no one to address the Council, the Mayor Pro-Tem called for the question. Roll call vote was as follows:

Mrs. Cook – yes	Mr. Head – yes
Mr. Pierce – yes	Mayor Curry – yes
Mr. Weaver – yes	motion carried.

RESOLUTION NUMBER 5390

Public Hearing – Resolution Number 5390 – A Resolution Approving An 020 – Restaurant Retail Liquor License For HHCS OPCO LLC d/b/a Cajun Steamer Cahaba Heights; Gaston Lanaus IV, Brian Fauver And Jeffrey G. Brock, Executives

MOTION Motion to approve Resolution Number 5390 was by Mr. Pierce and seconded by Mrs. Cook.

Gaston Lanaus, IV, was present in regard to this request.

Mr. Pierce asked about training of employees to prevent the sale of alcohol to minors.

Mr. Lanaus stated that their management staff are certified and they go through extensive training with employees to ensure proper identification is shown before allowing alcoholic beverage purchases.

Mrs. Cook asked about anticipated opening date.

Mr. Lanaus stated that they are targeting May 23 for a soft opening celebration with proceeds given to a local charity during the day and then a local hero dinner that night.

The Mayor Pro-Tem opened the floor for a public hearing. There being no one to address the Council, the Mayor Pro-Tem closed the public hearing and called for the question. Roll call vote was as follows:

Mrs. Cook – yes	Mr. Head – yes
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Mr. Pierce – yes
Mr. Weaver – yes

Mayor Curry – yes
motion carried.

NEW BUSINESS (UNANIMOUS CONSENT REQUESTED)

The Mayor Pro-Tem indicated that the next item needed unanimous consent for consideration and action on Resolution Number 5391. He opened the floor for a motion.

MOTION Motion for unanimous consent for consideration and action of Resolution Number 5391 was by Mr. Pierce and seconded by Mrs. Cook. Roll call vote as follows:

Mrs. Cook – yes	Mr. Head – yes
Mr. Pierce – yes	Mayor Curry – yes
Mr. Weaver – yes	motion carried.

RESOLUTION NUMBER 5391

Public Hearing – Resolution Number 5391 - A Resolution Authorizing The City Manager To Expend Additional Funding For The Vestavia Hills Fire Department In Response To Inflation, Unexpected Mechanical Failures And Station Repairs

Mr. Downes stated that the City rarely requests additional funding from the Council but, following some recent major mechanical failures, the increased cost of diesel fuel, and some property repairs that were needed caused the Vestavia Hills Fire Department to requested this funding.

Chief Green explained.

Discussion ensued.

MOTION Motion to approve Resolution Number 5391 was by Mrs. Cook and seconded by Mr. Pierce.

The Mayor Pro-Tem opened the floor for a public hearing. There being no one to address the Council, the Mayor Pro-Tem closed the public hearing and called for the question. Roll call vote was as follows:

Mrs. Cook – yes	Mr. Head – yes
Mr. Pierce – yes	Mayor Curry – yes
Mr. Weaver – yes	motion carried.

FIRST READING (NO ACTION TO BE TAKEN AT THIS MEETING)

- Public Hearing – Resolution Number 5389 – A Resolution Authorizing The City Manager To Expend Additional Funding For Final Designs On Proposed Intersection Improvements

At Sicard Hollow Road And Blue Lake Drive And To Authorize The City Manager To Accept A Proposal With Sain Associates To Provide Said Supplement Design Services

- Public Hearing – Ordinance Number 3098 – Rezoning And Conditional Use Approval – 4538 Pine Tree Circle; Lot 43, Topfield Subdivision; Request To Rezone From Vestavia Hills R-1 To Vestavia Hills B-3 With A Conditional Use For Use As A Veterinary Clinic, Grooming And/Or Boarding Of Dogs
- Public Hearing – Ordinance Number 3099 – An Ordinance Repealing Ordinance Number 2331, 2331-A, And 2331-B And Establishing A New Vestavia Hills Zoning Code

CITIZEN COMMENTS

David Harwell, 1803 Catala Road, made comments about the proposed round-about, saying they are helpful and work well in places he has traveled such as Germany. He stated that he feels more monies should be allocated to paving roadways in the City. He asked that the Council put priority on improving some of the intersections of the City and wanted to know the status of those studies, especially the intersection of Columbiana and Montgomery Highway.

Mrs. Cook stated that Mr. Harwell has covered many things in these comments and that the Council has made infrastructure improvements a priority. She stated that there is now a paving plan for the first time in our city's history that paves every road in our city once every 20 years. The city is in the third or fourth year of our paving plan.

At 6:48 PM, Mrs. Cook made a motion to adjourn. The meeting adjourned at 6:49 PM.

Ashley C. Curry
Mayor

ATTESTED BY:

Rebecca Leavings
City Clerk

RESOLUTION NUMBER 5389

A RESOLUTION AUTHORIZING THE CITY MANAGER TO EXPEND ADDITIONAL FUNDING FOR FINAL DESIGNS ON A PROPOSED INTERSECTION IMPROVEMENT AT SICARD HOLLOW ROAD AND BLUE LAKE DRIVE AND TO AUTHORIZE THE CITY MANAGER TO ACCEPT A PROPOSAL WITH SAIN ASSOCIATES TO PROVIDE SUPPLEMENTAL DESIGN SERVICES

WHEREAS, the City Council appropriated funding to match an APPLE grant through the Regional Planning Commission of Greater Birmingham; and

WHEREAS, as a part of this study, Sain Associates reviewed the intersection of Blue Lake Drive and Sicard Hollow Road and determined that a roundabout design would help to improve the overall safety and operations of this intersection; and

WHEREAS, the City has received a proposal from Sain Associates to allow the project to move forward to the design phase at a total expense of \$211,750, a copy of which is marked as Exhibit A, attached to and incorporated into this Resolution Number 5389 as if written fully therein; and

WHEREAS, the Mayor and City Council feel it is in the best public interest to approve said expenditure in order to allow this project to move forward through design and ultimately to the bid services for this project.

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND CITY COUNCIL OF THE CITY OF VESTAVIA HILLS, ALABAMA, AS FOLLOWS:

1. That the City Manager is authorized to accept the proposal by Sain Associates in an amount not to exceed \$211,750 for final design plans as described above; and
2. The City Manager is authorized to execute and deliver any and all documents necessary in order to secure said designs; and
3. These designs shall be expensed to the City's Capital Projects Fund; and
4. This Resolution Number 5389 shall be effective immediately upon adoption and approval.

ADOPTED and APPROVED this the 23rd day of May, 2022.

Ashley C. Curry
Mayor

ATTESTED BY:

Rebecca Leavings
City Clerk

CITY OF VESTAVIA HILLS
DEPARTMENT OF PUBLIC SERVICES
OFFICE OF CITY ENGINEER
INTER-DEPARTMENT MEMO

May 3, 2022

To: Brian Davis, Department of Public Services

Cc: Christopher Brady, City Engineer

From: Lori Beth Kearley, Senior Civil Engineer

RE: Fee Proposal for Engineering Design Services for Intersection Improvements at Blue Lake Drive and Sicard Hollow Road

The intersection of Blue Lake Drive and Sicard Hollow Road was studied through the Regional Planning Commission of Greater Birmingham’s Advanced Planning, Programming, and Logical Engineering (APPLE) program back in 2019. As part of this study, Sain Associates reviewed this intersection and determined that a roundabout design would help to improve the overall safety and operations of this intersection. Jefferson County has agreed to jointly fund construction of the project with an estimated construction cost of \$2.02 million (at time of APPLE study).

The City entered into an agreement with Sain Associates in April 2020 to perform further engineering and surveying due diligence to develop a conceptual layout of the roundabout and determine potential right-of-way and utility impacts. The fee proposal for those services totaled \$57,900.

Now that this effort has been completed, Sain Associates has submitted another proposal to move the project forward to final design plans. The scope items and associated fees included in the proposal are as follows:

Roadway Design Plans.....	Lump Sum \$126,000
Right of Way Sketches, Legal Descriptions, and Staking.....	Lump Sum \$6,600
Utility Coordination.....	Hourly with estimated budget of \$11,000
Environmental (Environmental Inc plus 10% markup).....	Not to Exceed \$13,750
Geotechnical (Bhate plus 10% markup).....	Lump Sum \$13,700
Lighting Design (Volkert plus 10% markup).....	Lump Sum \$16,700
Meetings and Reviews.....	Lump Sum \$13,500

Contract Documents, Advertising, and Bidding.....Lump Sum \$10,500
Total Estimated Budget.....\$211,750

We are seeking the City Council’s consideration in approving this proposal amount to allow us to move forward with the design, coordination, and bid services for the project.

If any additional information is needed, please let me know.



SAIN
ASSOCIATES

February 28, 2022

Mr. Christopher Brady, P.E.
City Engineer
City of Vestavia Hills
1032 Montgomery Highway
Vestavia Hills, AL 35216

Two Perimeter Park South
Suite 500 East
Birmingham, Alabama 35243
Telephone: (205) 940-6420
www.sain.com

SUBJECT: Blue Lake Drive and Sicard Hollow Road Design Services
Supplemental services
SA Project #20-0098

Dear Christopher:

We appreciate the opportunity to submit this proposal for supplemental engineering services. Following is a description of our understanding of your project and the scope of services that we propose to undertake.

General Project Understanding

Sain Associates previously prepared a traffic study for the Blue Lake Drive and Sicard Hollow Road intersection. The study yielded a recommendation for a roundabout as the preferred option for improving the intersection. Sain prepared a conceptual layout of the roundabout, along with estimated impacts to utilities and right of way. The City has reviewed the layout and desires to move the project forward to final design plans.

The City has discussed the project with Jefferson County. The City and County will jointly fund the project with local funding. This proposal is based upon reviews and approvals being required from only the City and County. It is not expected the City of Birmingham or the Alabama Department of Transportation (ALDOT) will be involved in the project. However, the project does encroach into the I-459 right of way. Based on our discussion with the City, permitting with ALDOT is not expected, but a discussion with ALDOT is needed with possibly obtaining a letter from ALDOT to document their approval of the encroachment. At the time of preparing this supplement, no discussion with ALDOT has been conducted at the direction of the City. The City will contact ALDOT as the project progresses.

The project may have impact to existing waterlines. Sain has subcontracted Bhate to perform a subsurface utility exploration (SUE) to determine a more accurate horizontal and vertical location of the underground waterlines in the intersection. The SUE is complete and has been surveyed, and we are preparing an exhibit to show the underground utilities as located by the SUE investigation. Once complete, Sain will submit the report and exhibit to the City for review. Further coordination with Birmingham Waterworks will be necessary to determine if the existing waterlines can remain in place or will require relocation or protection.

The required traffic and topographic survey have already been performed under the original contract for this project. The traffic will require updating to current year and design year projections for the

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City of Vestavia Hills
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geotechnical pavement recommendations. Our understanding is the traffic report has been reviewed and approved by the City and County.

The project will impact existing ditches, which may be determined to be jurisdictional waters. Sain will contract Environmental Inc to prepare a stream and wetland study to determine if the project improvements have impacts to jurisdictional waters. It is suspected the project may require a Nationwide Permit from the U.S. Corps of Engineers. As a result, the preparation and submittal of a Nationwide Permit has been included in this scope of services. A cultural resources report and threatened and endangered species study will also be prepared. Additional detail of the scope of services to be provided by Environmental Inc is included in their attached proposal.

The center circular island will be sodded. Sain will prepare an exhibit with sight lines and high/low growth areas for use when the City landscapes the roundabout in the future. No pedestrian or bicycle accommodations will be included in the project. Lighting design services and the preparation of a geotechnical report with recommendations have also been included in this scope of services.

Scope of Services

Roadway Design Plans:

Upon receiving notice to proceed from the City, Sain will prepare a preliminary (50%) plan set for review by the City and the County. The preliminary set will include a refined layout, grading plans, traffic control phasing, and a preliminary storm drainage design. This set will be submitted to the City for review and comment prior to proceeding with preparation of the final plan assembly. The following plan sheets are expected to be included in the overall final plan assembly:

- Title sheet with index
- Legend and abbreviations sheet
- Project notes
- Roadway typical sections and ditch typical sections
- Quantity summary list
- Geometric control layout
- Plan and profiles for proposed roundabout
- Drainage profiles and details, as necessary
- Paving layout sheets, including construction details for splitter islands
- Roundabout grading plan
- Signing and striping plans
- Traffic control notes and details
- Traffic control plans
- Utility sheets
- Erosion control plans
- Cross sections within roundabout and for segments of roadway beyond roundabout

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Sain anticipates that the required storm drainage system will consist of a combination of concrete flumes and ditches, along with inlets and storm sewer pipe. The following storm design years will be used for analysis of the required drainage system:

- Inlets and closed storm sewer pipe - 10 year
- Crossdrain/culvert - 50 year but not overtop for the 100 year
- Ditches -25 year, unless downstream of crossdrain/culvert, then follows the same design storm as crossdrain/culvert

According to FEMA flood mapping effective 9/24/2021, the project impacts will be just beyond the Cahaba River special flood hazard area, so floodplain modeling and mapping have not been included within this scope of services.

In addition to the 50% plan submittal and review described above, plan submittals and City reviews will occur at 85% and 100% completion. An opinion of probable construction costs will be included with each plan submittal. Plans will be prepared to current ALDOT standards and specifications.

This project will require an NPDES permit from ADEM if disturbance exceeds 1 acre. We will coordinate this submittal with the City as the Permittee. ADEM requires the Permittee create an online account, and we will assist you through this process if needed. The permit application fee is not included within this scope and will need to be submitted to ADEM by the City.

Right of Way Sketches, Legal Descriptions, and Staking:

The project has impact to properties. Sketches and legal descriptions for up to two acquisitions will be prepared. The legal description will be prepared in "metes & bounds" format using the deflection angle method. The legal descriptions will be tied to an available government corner (section corner, quarter section corner). The legal descriptions will describe the perimeter of the properties and indicate the directions and distance of each leg of the easement/ Right-of-Way takings. We have accounted for revisions based on the City and County's reviews. Sain will also stake the acquisitions if deemed necessary. Additional Right of Way services, such as appraisals and acquisitions, are not included in the scope of services.

Utility Coordination:

The project does have impact to existing utilities which will require relocations. Sain will prepare existing utility base sheets to be a part of the final plan assembly and will provide plans to utility owners for a review of potential conflicts. If the City and utility owners determine the relocation of utilities is necessary, Sain will incorporate into the plan set any relocation plans prepared by utility companies for the contractor's reference. Sain's preparation of utility relocation plans is not included in this scope of services.

Environmental Studies:

Environmental Inc will prepare the stream and wetland study, cultural resources study, and threatened and endangered species study. If the improvements result in impacts to jurisdictional waters, they will also

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prepare and submit an application for a Nationwide Permit. See their attached proposal for additional detail of their scope of services. If a Nationwide Permit is not required for the project, the City will not be billed for that service.

Geotechnical:

Bhate Geosciences will prepare the geotechnical investigation report, as detailed in the attached proposal, in order to provide geotechnical recommendations for the project.

Lighting Design:

Roadway lighting is recommended for the roundabout to allow approaching drivers to perceive and react to the intersection at nighttime. Volkert will prepare the lighting design plans.

Meetings and Reviews:

Sain has budgeted for the following face-to-face meetings:

- 50% review meeting
- 85% review meeting
- Two additional meetings with the City, possibly to present to the City Council

Contract documents, Advertising, and Bidding:

Sain will prepare contract documents necessary for the project. We will utilize the AIA standard documents for the front end documents, contract, and general conditions. The ALDOT specifications will be utilized as the technical specifications for the work. Sain will prepare any required special conditions for insertion into the contract documents. Sain will prepare an advertisement for bids and will advertise according to the state bid law requirements.

As part of this task, Sain will respond to contractor's requests for information (RFIs), conduct a Pre-Bid meeting, attend the bid opening, and prepare a bid tabulation and recommendation of award letter.

Construction services:

Services related to construction are not included in this supplement. However, if the City decides that construction services are desired once the project nears construction, Sain will work with the City and County to determine the level of services needed and can provide a supplemental services agreement at that time.

Exclusions

The following services are excluded from this proposal but can be provided if deemed necessary and requested by you: ROW appraisals and acquisitions, ROW map, ALDOT permitting or reviews, City of Birmingham permitting or reviews, environmental document, construction staking, public meetings, No-Rise Certification and/or floodplain modeling, retaining wall design, landscaping or irrigation design, CE&I, or other work not specifically included. Although not anticipated at this time, if the need arises for any of the items listed above, we will not begin the work until we have received written authorization from you to proceed with the additional services.

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Fees

We propose to provide the above described services based on the following fee schedule:

Roadway Design Plans	Lump Sum \$126,000
Right of Way Sketches, Legal Descriptions, and Staking	Lump Sum \$6,600
Utility Coordination	Hourly with estimated budget of \$11,000
Environmental (Environmental Inc plus 10% markup)	Not to Exceed \$13,750
Geotechnical (Bhate plus 10% markup)	Lump Sum \$13,700
Lighting Design (Volkert plus 10% markup)	Lump Sum \$16,700
Meetings and Reviews	Lump Sum \$13,500
Contract Documents, Advertising, and Bidding	Lump Sum \$10,500
 Total Estimated Budget	 \$211,750

Reimbursable expenses such as printing, shipping, mileage, etc. are included in the above fees.

Procedures for Changes in Scope of Work

The scope of work documented herein is based upon information known as of the date of this proposal. Should future changes (e.g. site plan, regulatory, project phasing, additional meetings, etc.) necessitate changes in the scope of work, we will contact you to discuss the scope of the additional work and its impact to our contracted fees and project schedule. No additional work will be undertaken by Sain or our subconsultants without your authorization.

Terms and Conditions

This contract is subject to the enclosed Terms and Conditions. All subsequent services required by you outside the scope of service specified will be performed on a time and materials basis according to the schedule of rates enclosed. Any modification to this contract document must be approved in writing by both parties with approval indicated by each signatory's initials and the date of approval.

Proposal Limitations

We reserve the right to withdraw or modify this proposal if not contracted within 60 days.

Sain Associates has provided this proposal with the understanding that you have selected our firm to perform professional services based upon our staff's qualifications, experience and reputation and not solely upon the cost of the services proposed. We trust the fees outlined herein are acceptable and within your project budgetary plans. We look forward to commencement of the work and will be glad to address any questions or concerns you have regarding the technical scope and/or schedule of fees for this proposal. If you should request additional prices for the scope of work included herein from other consulting engineers and/or land surveyors, please consider our proposal withdrawn in order to comply with Alabama Administrative Code Chapter 330-X-14-.05(f).

Blue Lake Drive Roundabout
City of Vestavia Hills
February 28, 2022
Page 6



Schedule

We are available to start work upon authorization. The 50% design plans can be submitted within 2 months of starting work.

Thank you for the opportunity to provide this proposal. If you have any questions or need clarification on any item, please call me. We look forward to working with you.

Sincerely,

SAIN ASSOCIATES, INC.

Nathan Currie, P.E.
Project Manager/Associate
AL #32400

OFFERED:
SAIN ASSOCIATES, INC.
BY: Alicia Bailey, P.E.
Practice Leader/Sr. Principal

Signature of Authorized Representative

Date: 2/28/22

Enclosures:
Sain Terms & Conditions (sch. 2022)
Bhate Geosciences Proposal
Environmental Inc Proposal
Volkert Proposal

ACCEPTED:
CITY OF VESTAVIA HILLS, ALABAMA

BY: _____
Signature of Authorized Representative

Print Name & Title

Date: _____

SAIN ASSOCIATES, INC.

TERMS AND CONDITIONS

Rates:

Principal.....	\$190.00 - \$275.00 per Hour
Engineer/Planner.....	\$98.00 - \$148.00 per Hour
Senior Engineer.....	\$150.00 - \$210.00 per Hour
GIS Professional.....	\$125.00 - \$135.00 per Hour
Designer.....	\$87.00 - \$125.00 per Hour
Surveyor.....	\$100.00 - \$140.00 per Hour
Survey Crew (1-Person).....	\$100.00 per Hour
Survey Crew (1-Person + Robot).....	\$150.00 per Hour
Survey Crew (2-Person).....	\$175.00 per Hour
Survey Crew (3-Person).....	\$215.00 per Hour
Survey Per Diem.....	\$150.00 per person per Night
Level 1 Inspector.....	\$75.00 - \$95.00 per Hour
Level 2 Inspector.....	\$80.00 - \$110.00 per Hour
Administrative Support.....	\$60.00 - \$75.00 per Hour

Reimbursable Expenses

Printing, contract carrier service, and travel expenses are not included within Consultant's basic fee and will be passed along to Client at cost plus 10%.

Payment

Payment for services by Consultant is to be made monthly based upon the percentage of work completed and invoiced to Client. Client's obligation to pay for services rendered hereunder is in no way dependent upon its ability to obtain financing, to obtain payment from a third party, or to obtain approval of any governmental or regulatory agencies, or upon Client's successful completion of the project. Payment for services and expenses hereunder is due in full within thirty (30) days after receipt of invoice. For past due accounts in excess of 120 days Consultant will issue a past due statement with interest of 1½% per month from said thirtieth (30th) day. Consultant may elect to seek assistance in collection of accounts in excess of 120 days in which case Client will be billed for attorney's fees for collection in the amount of 1/3 of the outstanding balance or such greater amount as the court finds reasonable. Consultant reserves the right to suspend services under this agreement until receipt of payment in full for all amounts due for services rendered and expenses incurred.

AL Immigration Law Compliance

By signing this contract, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the state of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting there from.

Standard of Care

The standard of care for all professional services performed or furnished by Consultant under this Agreement will be the skill and care ordinarily provided by members of Consultant's profession practicing under the same or similar circumstances and professional licenses at the same time and in the same locality, as expeditiously as is prudent considering the ordinary professional skill and care of a competent member of Consultant's profession. Consultant makes no warranties, express or implied, under this Agreement or otherwise, in connection with Consultant's services.

Responsibility of the Client

Client shall provide all criteria and full information as to Client's requirements for the Project, including budgetary limitations.

Reliance on Information Provided by Others

Consultant shall be entitled to rely, without liability, on the accuracy and completeness of any and all information provided by Client, Client's Consultants and Contractors, and information from public records, without the need for independent verification.

Schedules, Budgets and Estimates or Opinions of Cost

Any schedules or completion dates, budgets, or estimates of cost prepared by Consultant represent Consultant's professional judgment based on its experience and available information. Since neither Consultant nor Client has control over: the cost of labor, materials, or equipment, or contractor's methods of determining prices; competitive bidding or market conditions; utility conflicts or right-of-way acquisition; agency approval times or actions of a Consultant Program Manager not employed by Sain, the Consultant cannot and does not warrant or represent that actual schedules, budgets or completion dates or actual costs will not vary from schedules or completion dates, budgets or estimates of cost prepared by Consultant or proposed, established, or approved by Client.

Approvals

Client agrees and acknowledges that the approval process necessary to maintain a project timeline is both unpredictable and outside of the Consultant's control. Consequently, the Consultant makes no representations as to its ability to timely achieve or to obtain said permits or approvals from any governing authority or outside agency.

Site Visits/Jobsite Safety/Construction Phase Services

Consultant and Client acknowledge and agree that the Consultant shall not have responsibility and will not be liable for jobsite safety or construction means and methods, regardless of whether Consultant's scope of services documented herein include site visits during the construction phase. The Consultant is not responsible for, and shall by no means be liable for, the acts or omissions of any owner, contractor, subcontractor or material supplier.

Right of Entry

Client, at its sole cost and expense, shall furnish the Consultant, its agents, employees, and subcontractors a right-of-entry and any other authorizations or licenses needed for Consultant to enter the Project location to perform the services contemplated by this Agreement. Client agrees and acknowledges that the services provided by the Consultant may require certain activities that may disrupt the use of the Project's property location and may disturb, alter, or damage the terrain and vegetation thereabout and that Consultant will not restore the property to its original state.

Certifications

Consultant shall not be required to sign any documents, no matter by whom requested, that would result in Consultant's having to certify, guaranty, or warrant the existence of conditions that Consultant cannot ascertain or verify. Further, Consultant and Client acknowledge and agree that Consultant shall not be



SAIN ASSOCIATES, INC.

TERMS AND CONDITIONS

Exhibit A - Resolution No. 5389

expected to provide any certifications unless expressly agreed upon by Consultant, as evidenced in writing within the scope of Consultant's work invoiced to Client.

Unforeseen Conditions and Occurrences

If, during the course of performance of services pursuant to this Agreement, any unforeseen hazardous substance, material, object, element, or other unforeseen conditions or occurrences are encountered which, in the Consultant's judgment, materially affects or may affect the services to be provided hereunder, the risk involved in providing the services, or the scope of the services, Consultant will notify Client. Subsequent to that notification, Consultant may: (a) if practicable, in Consultant's judgment and with Client's approval, complete the original scope of services in accordance with this Agreement; (b) agree with Client to modify the scope of services and the estimate of costs to include the previously unforeseen conditions or occurrences, such revision to be in writing and signed by the Parties and incorporated herein; or (c) terminate the services effective on the date of notification for convenience.

Use of Electronic Media

Copies of documents that may be relied upon by the Client are limited to the printed copies (also known as hard copies) that are signed or sealed by Consultant. Files in electronic media format or text, data, graphic or other types that are furnished by Consultant to Client are only for convenience of the Client. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. When transferring documents in electronic media format, Consultant makes no representations as to long-term compatibility, usability, or readability of documents resulting from the use of software application, operating systems or computer hardware differing from those in use by Consultant at the beginning of this assignment.

Limitation of Remedies

Liability of remedies of Sain Associates, Inc. resulting from errors, omissions, or the negligence of Sain Associates, Inc., its agents or employees, pursuant to work under this agreement shall not exceed the lesser of the value of engineering or surveying services required to correct the deficiency or the basic consulting fee for work covered hereunder or the actual cost of the remedies. This provision is being agreed to as a result of the fees being charged.

Consultant's Choice of Arbitration or Court

Client and Consultant agree that if a dispute arises out of or relates to this Agreement, the parties will attempt to settle the dispute through good faith negotiations. If direct negotiations do not resolve the dispute, the parties agree to endeavor to settle the dispute by mediation prior to the initiation of any legal action unless delay in initiating legal action would irrevocably prejudice one of the parties. Mediation shall take place in Jefferson County, Alabama, and if a mediator cannot be agreed upon by parties, then it is agreed that AAA (American Arbitration Association) will appoint a mediator. If mediation is unsuccessful, any such dispute shall be subject to and resolved at the election of Consultant, by either arbitration in accordance with the Rules of the AAA or by a trial by judge in either the Circuit Court for Jefferson County, Alabama, or the United States District Court for the Northern District of Alabama.

Indemnification

Client and Consultant each agree to indemnify and hold the other harmless, and their respective officers, employees, agents and representatives, from and against liability for all claims, losses, damages and expenses, including reasonable attorneys' fees, to the extent such claims, losses, damages, or expenses are caused by the indemnifying party's negligent acts, errors or omissions. In the event claims, losses, damages or expenses are caused by the joint or concurrent negligence of Client and Consultant, they shall be borne by each party in proportion to its negligence.

Force Majeure

Neither party shall be deemed in default of this Agreement to the extent that any delay or failure in the performance of its obligations results from any cause beyond its reasonable control and without its negligence.

Termination of Contract

Client may terminate this Agreement with seven days prior written notice to Consultant for convenience or cause. Consultant may terminate this Agreement for cause with seven days prior written notice to Client. Failure of Client to make payments when due shall be cause for suspension of services or, ultimately, termination, unless and until Consultant has been paid in full all amounts due for services, expenses and other related charges.

Ownership of Documents

All documents prepared or furnished by Consultant pursuant to this Agreement are instruments of Consultant's professional service, and Consultant shall retain an ownership and property interest therein. Consultant grants Client a license to use instruments of Consultant's professional service for the purpose of constructing, occupying and maintaining the Project. Reuse or modification of any such documents by Client, without Consultant's written permission, shall be at Client's sole risk, and Client agrees to indemnify and hold Consultant harmless from all claims, damages and expenses, including attorneys' fees, arising out of such reuse by Client or Client's disclosure of any such documents to any third party.

Third Parties

Nothing contained in this Agreement shall create a contractual relationship with, or a cause of action in favor of, a third party against either the Client or Consultant. Consultant's services hereunder are being performed solely for the benefit of the Client, and no other entity shall have any claim against Consultant because of this Agreement or Consultant's performance of services hereunder.

Consequential Damages Waiver

Neither the Client nor the Consultant shall be liable to the other or shall make any claim for any incidental, indirect or consequential damages arising out of, or connected in any way to the Project or this Agreement. This mutual waiver includes, but is not limited to, damages related to loss of use, loss of profits, loss of income, loss of reputation, unrealized savings or diminution of property value and shall apply to any cause of action including negligence, strict liability, breach of contract and breach of warranty.

Conflicting or Inconsistent Terms/Severability

In the event that any term, condition, provision, requirement or specification set forth in this body of the agreement conflicts with or is inconsistent with any term, condition, provision, requirement or specification in any exhibit and/or attachment to this agreement, the provisions of this body of the agreement shall prevail. Any provision of this Agreement which is held to be void or unenforceable shall be ineffective to the extent of such unenforceability without invalidating the remaining provisions.

Schedule 2022





Bhate Geosciences Corporation
Geotechnical, Materials, Environmental Engineers

February 4, 2022

Mr. Nathan Currie
Sain Associates
2 Perimeter Park East, Suite 500
Birmingham, Alabama 35243

Subject: Proposal to Provide Subsurface Exploration,
Geotechnical Engineering and Materials Evaluation
Proposed Traffic Roundabout
Blue Lake Drive at Sicard Hollow Road
Vestavia Hills, Alabama
BHATE Proposal Number: 2092-22

Dear Nathan:

We are pleased to submit the following proposal to perform a subsurface exploration and geotechnical/materials evaluation of the area proposed for roadway improvements and construction of a new roundabout at the intersection of Cahaba Heights Road, Blue Lake Drive, and Sicard Hollow Road. You provided us with a satellite image on which the planned surface improvements were overlaid. It was apparent that some of the planned construction was confined to currently paved areas, while other improvements extended beyond the existing pavements and into the shoulders of the road.

We understand the objective of the subsurface/materials evaluation would be to determine the current roadway pavement sections in the event the "equivalent buildup" method of design is applied to the new or improved pavements. In addition, you requested that we perform a subsurface exploration to obtain representative samples of the proposed roadway subgrade, conduct laboratory tests to evaluate the load carrying capacity, and conduct a traditional pavement thickness evaluation based on traffic information (current volume and loading, expected pavement life, and growth factor) It is our understanding that grading of the proposed improved areas would be minimal; however, it is possible that some widening of shoulders over sloping or wooded ground could take place.

The exploration program would consist of two elements: coring through the existing pavement in sufficient places to permit a statistical evaluation of the pavement buildup to be conducted. We recognize that the pavement thickness are various locations along the three roads is likely to vary considerably, and thus is it important to have sufficient data points to perform a reasonable assessment of the "average" pavement buildup. We would not perform a detailed pavement condition assessment, but would note the general condition of the pavement surface and any particular areas exhibiting severe distress.

Following is our proposed scope of services:

1. Coring through the current pavement at an estimated eight (8) to twelve (12) locations. The number of locations cored would be dependent on the uniformity of the initial field data. If the initial thickness measurements are all relatively uniform, then we would drill the lesser number of locations. Following coring through the asphalt we would extend hand auger probes through the underlying aggregate base course (if present). We would also manually probe the subgrade beneath the base course, and apply an asphalt patch upon completion.
2. Mobilization of a truck-mounted drilling rig.
3. Site reconnaissance, test boring layout, and pavement condition and geologic map review.
4. Soil test borings – boreholes would be backfilled upon completion. Some settlement of the borehole backfill should be expected.
 - Roadway widening areas - 12 soil test borings to depths ranging from approximately six (6) to 15 feet each or refusal
5. Laboratory soil classification testing
 - Soil moisture content tests (24)
 - Atterberg limits tests (6)
 - Wash #200 sieve analyses (6)
 - California bearing ratio tests performed on representative samples of new pavement subgrade (2)
6. Geotechnical evaluation of the proposed pavement areas and report preparation.

REPORT

Based on the scope of services described, our report would address the following items:

1. Site geology and surface conditions.
2. A description of the surface conditions and a general narrative of the current pavement condition.
3. The cumulative pavement thickness at the locations where coring through the existing pavement takes place.
4. A description of the subsurface conditions at the test boring locations.
5. Laboratory test results.

6. Site preparation and grading considerations pertaining to potential pavement widening areas.
7. Pavement subgrade considerations, and an alternate pavement design based on traffic information to be provided by Sain, and results of laboratory tests performed on representative subgrade samples.
8. We have assumed that all new fill slopes would have design inclinations of 3H:1V or flatter. In the event that steeper slopes are planned, we should be notified so that we can develop a scope of supplementary services which would likely include laboratory strength testing on samples of the planned embankment fill and slope stability analyses.

ESTIMATED COST

Our services would be conducted on a unit-rate basis in accordance with our 2022 unit-fee schedule. However, based on the proposed scope of services and assuming no unusual subsurface conditions are encountered, our budget estimate is **\$11,996.00 to 12,426.00.** Submittal of the written report would culminate the services to be provided under this proposal. Post-report consultation or attendance at project meetings would be charged on a unit-rate basis for the Bhate personnel involved. If site conditions encountered during exploration warrant additional exploration or evaluation, then we would notify you and discuss the recommended additional services. However, the budget would not be exceeded without your authorization.

We have assumed the locations where drilling would take place would be accessible to a truck-mounted drilling rig. Costs associated with site access preparation, mobilization of special equipment, etc. by virtue of difficult terrain, dense vegetation or wet surficial soils would be in addition to the basic budget estimate. In the event drilling on the sides of slopes is anticipated, site access preparation, including clearing of trees and benching into the existing slopes would likely be required.

The planned widening and roundabout areas are located where three heavily-travelled roads converge. As a result, traffic control will be essential to permit our field crews to safely perform the proposed exploration program in and adjacent to the roads, and to protect motorists. We have not included traffic control in our scope of services. Over the years we have counted on the municipality/client to furnish a squad car and officer as a means of traffic control. We anticipate that our field exploration can probably be completed in two days. If Bhate is required to furnish traffic control measures such as signage and flagmen, then we should be notified so that we can obtain pricing from a service that provides traffic control.

SCHEDULE OF SERVICE PERFORMANCE

We anticipate field work could begin approximately ten (10) business days after we receive written authorization to proceed, and a written report of our findings would be issued within approximately three (3) weeks after the completion of the field exploration.

UNDERGROUND UTILITIES

We will notify the underground utility location service of our intent to drill or dig. However, we understand that BHATE has been engaged to perform subsurface utility mapping of the planned construction areas, and we assume that field marking of identified utilities will be conducted prior to the start of the subsurface exploration.

GENERAL NOTES

We (BHATE) would perform only those services outlined previously. Client and BHATE may subsequently agree in writing to provide additional services under this agreement for additional negotiated compensation.

Services we provide would be consistent with the engineering practices prevailing at the time and in the area the services are performed. No other warranty, expressed or implied, is intended. Our geotechnical report would be prepared for the exclusive use of our client and

AUTHORIZATION

The attached General Terms and Conditions should be acknowledged as a part of this proposal. A signed copy of the attached Proposal Acceptance Sheet, returned to our office, would serve as our authorization to proceed with the proposed scope of services.

CLOSING

We appreciate the opportunity to present this proposal to you. When you have reviewed this proposal, feel free to call us if you have any questions or if you wish to discuss the proposal in detail.

Respectfully submitted,

BHATE GEOSCIENCES CORPORATION

Charles R. Burgin

Charles R. Burgin, P.G., P.E.
Senior Principal

attachments

Traffice Roundabout
Blue Lake Drive at Sicard Hollow Road
Vestavia Hills, Alabama
BHATE Proposal Number: 2092-22
Page 4





ENVIRONMENTAL, INC.

96B Cogswell Avenue, Pell City, Alabama 35125

Environmental, Remediation, and Ecological Consultants

January 27, 2022

Mr. Nathan Currie
Sain Associates, Inc.
Two Perimeter Park South, Suite 500 East
Birmingham, Alabama 35243

Subject:
Proposed Scope of Services & Fees
Blue Lake Drive
Vestavia Hills, Jefferson County, Alabama
Environmental, Inc. Proposal No.: E22-19

Dear Mr. Currie:

Environmental, Inc. is pleased to provide this proposed Scope of Services to be performed on the Blue Lake Drive Roadway Improvements project site in Vestavia Hills, Jefferson County, Alabama. It is our understanding that the project area consists of roadway improvements at the intersection of Blue Lake Drive and Sicard Hollow Road; the project limits were provided to our office via electronic mail on January 26, 2022.

I. WETLAND DELINEATION /THREATENED & ENDANGERED SPECIES SCOPE

Environmental, Inc. will provide qualified personnel to assess the property and determine the presence/absence of any potential jurisdictional wetlands and/or Waters of the U.S., as defined by the U.S. Army Corps of Engineers (USACE) Field Guide for Wetland Delineation, 1987 Corps of Engineers Manual (Manual) and the Regional Supplement to the Corps of Engineers Manual for the Eastern Mountains and Piedmont Region (April 2012). Environmental, Inc. will also provide qualified personnel to conduct a Threatened & Endangered Species Assessment in accordance with US Fish & Wildlife Service (USFWS) procedures. The Wetland/Threatened & Endangered Species Assessment will include, at a minimum, the following services:

- A review of publically available aerial photographs and hydrologic maps.
- A review of published literature regarding the watershed, geology, soils, and topography of the general area of the site.
- A reconnaissance of the subject site to review representative vegetation and hydrology information.
- Flagging the identified USACE jurisdictional features (if any) identified on the site and locating the boundary of jurisdictional features via handheld GPS.
- Submittal of shape files of any identified USACE jurisdictional features.
- A review of published literature regarding habitat requirements, known distributions, and Recovery Plans for each USFWS target species.
- A site reconnaissance to observe the site for target species and USFWS target species habitat.
- Generation and submittal of a summary report detailing the findings of the assessments.

COST

Wetland/Threatened & Endangered Species Assessment \$ 2,500.00

Phone: (205) 629-3868 • Fax: (877) 847-3060

II. CULTURAL RESOURCE SURVEY SCOPE

Environmental, Inc. will provide qualified personnel to conduct a Cultural Resource Survey in accordance with the guidelines set forth by the Alabama Historical Commission (AHC). The survey will include, at a minimum, the following services:

- Background research for previously recorded archaeological sites, previous archaeological surveys, cemeteries, historic structures, and historic communities.
- A field assessment of the project area utilizing standard archaeological techniques including visual observation and subsurface shovel tests.
- Laboratory analysis of materials, if any, recovered from the site.
- Evaluation of the significance of any archaeological sites or historic properties identified, within the guidelines and criteria for establishing eligibility for the National Register of Historic Places (NRHP).
- Transportation of any collected archaeological materials to the University of Alabama Archaeological Museum in Moundville, Alabama.
- Completion of a Phase I Cultural Resource Assessment Report detailing our findings.

COST

Cultural Resource Survey \$ 2,500.00

III. USACE NATIONWIDE PERMITTING SCOPE (IF REQUIRED)

If required, the Nationwide Permitting process will be conducted in accordance with the guidelines set forth by the USACE for projects impacting less than 0.5-acres of waters of the U.S. The permit application will include, at a minimum, the following services:

- A written narrative of the proposed project activities, the basic project purpose and need, a discussion of the potentially jurisdictional streams and wetlands, a discussion of proposed unavoidable impacts, and information regarding archaeological and historical properties, and threatened and endangered species.
- Submission of maps, figures, and Wetland Data Forms, as required by the USACE.
- If mitigation is required, a discussion of proposed mitigation and coordination of mitigation credit purchase.

COST

USACE Nationwide Permit Application (If required) \$ 7,500.00



CLOSING & SCHEDULE

We are prepared to begin the assessment field work within 10 business days of notice to proceed with final reports submitted to your office within 30 days from the initiation of field work. Terms and Conditions for these services would be in accordance with the guidelines established in Sain Associates Consultant Contract for Services.

Thank you for allowing us to submit this information. We appreciate your consideration of Environmental, Inc. If you have any questions concerning this proposal, please call (205) 629-3868 or email cstinnett@envciv.com.

Sincerely,

ENVIRONMENTAL, INC.



Chad Stinnett
Senior Project Scientist





Volkert, Inc.

The Stockyard
1616 2nd Avenue South
Suite 150
Birmingham, AL 35233

205.214.5500
birmingham@volkert.com

www.volkert.com

February 11, 2022

Nathan Currie, P.E.
SAIN Associates
Two Perimeter Park South
Suite 500 East
Birmingham, AL 35243

Subject: Intersection Improvements On
Blue Lake Drive at Sicard Hollow Road
City of Vestavia
Jefferson County
Volkert Project No. TBD

Nathan,

Per our previous emails and telephone discussions, please find our scope and fee proposal for the above-mentioned project. Volkert will provide lighting design services as described herein and provide PDF's for SAIN to include in their bid documents.

Thanks for reaching out and we appreciate the opportunity to work with you on this project.

If you have any questions or need additional information, please do not hesitate to call.

Sincerely,
Volkert, Inc.

A handwritten signature in blue ink that reads "Ken W. Powers".

Ken W. Powers, P.E.
Manager, Electrical Department

KWP
Enclosures



SCOPE OF WORK:
ROUNABOUT LIGHTING FOR
INTERSECTION IMPROVEMENTS
BLUE LAKE DRIVE AT SICARD HOLLOW ROAD
CITY OF VESTAVIA
JEFFERSON COUNTY, AL
FOR SAIN ASSOCIATES

February 11, 2022

Description of Work:

This project will provide a roadway lighting system for one (1) new roundabout at the intersection of Blue Lake Drive and Sicard Hollow Road in Jefferson County. Currently, the intersection is neither lighted nor signalized. Scope and fee proposal is based on submittal documents provided by SAIN dated Feb 5, 2022, which included the proposed roadway configuration with an aerial overlay.

Design Approach:

The system will consist of conventional light poles throughout the intersection. LED light sources will be utilized.

Lighting calculations will be performed using the AGI32 lighting software developed by Lighting Analysts.

The lighting design will be in accordance with the minimum recommendations of IES DG-19-08, Design Guide for Roundabout Lighting, Table 1, and applicable local requirements. Assumed roadway classifications are Collector/ Collector. A Low Pedestrian Area Conflict classification is assumed. Based on these assumptions, the design will provide approximately a 1.2-foot candle average with a 4:1 or better uniformity.

A single layout will be designed to allow for at least two (2) manufacturer's luminaires to use the same pole locations and mounting heights and still meet or exceed IES and any City recommendations. The basis of design for LED sources will be the Holophane Mongoose and the Cooper Archeon, which are on ALDOT's list of approved luminaires.

One (1) single line wiring diagram will be designed based on the highest manufacturer's luminaire/driver load.

Volkert will coordinate with the local electrical utility to establish a new 240/480V single phase service.

Deliverables:

Volkert will provide PDF's of schedules, lighting layouts and single line diagrams to be included in SAIN's plan set for bidding purposes. Cadd files will be available in Microstation format. Upon request, all project files will be submitted on DVDs for each of the following submittals: Preliminary, 90%, and Final. Project files will include voltage drop calculations, lighting calculations, correspondence, cadd files, and an Engineer's Opinion of Probable Construction Cost.

Assumptions:

The proposed roundabout will have no pedestrian crosswalks or sidewalks, therefore lighting design will consider vehicular traffic only.

Survey files/base mapping/base plans/alignments will be provided by SAIN and will include proposed roadway and ground elevations.

Three (3) submittals and one (1) review meeting are anticipated, plus one site visit with the local electrical utility to coordinate electrical service.

Volkert will provide Erosion and Sediment Control quantities associated with construction of light pole foundations.

Excluded from Scope of Services:

Survey

Geo-tech for soil borings at pole locations (passive pressure graphs / L-pile info)

Utility coordination except as noted herein

Staking of pole locations

Traffic Control Plans / ESC Plans

Railroad Coordination

FAA Coordination

Construction Administration

Development of Record Drawings

**VOLKERT, INC.
MANPOWER AND FEE PROPOSAL**

FOR

SAIN Associates

PROJECT # TBD

Roundabout Lighting

City of Vestavia - Blue Lake Dr @ Sicard Hollow Rd

Roadway Lighting Design For

Sain Associates Project No. 20-0098

February 11, 2022

Project No.	TBD
County	Jefferson
Description	Roundabout Lighting - Blue Lake Dr at Sicard Hollow Rd
Scope of Work	Roadway Lighting Design
Project Length	0.20 Miles
Consultant	Volkert, Inc.
Fee Proposal (Roadway Plans)	

PERSONNEL COST			
	Man-days x Daily Rate		
Project Manager (10% of Eng.)	0.72	\$ 558.00	\$ 401.76
Engineer	7.15	\$ 459.00	\$ 3,281.85
Engineering Technician/CADD	4.87	\$ 317.00	\$ 1,543.79
Clerical	0.00	\$ -	\$ -
Total Direct Labor			\$ 5,227.40
Combined Overhead (%)	150.77		\$ 7,881.35
Out-of-Pocket Expenses**			\$ 67.12
Sub-Total			\$ 13,175.87
Operating Margin (15%)			\$ 1,976.38
Sub-Total			\$ 15,152.25
SUB-CONSULTANTS (attach man-day & fee FROM each sub-consultant; show total fee for each here)			
			\$ -
			\$ -
			\$ -
Subconsultant Administration Expense (5%)			\$ -
Sub-Total			\$ 15,152.25
Facilities Capital Cost of Money (% of Direct Labor)	0.313		\$ 16.36
TOTAL FEE			\$ 15,168.61

**See Grand Total Fee sheet

Project Number <u>TBD</u>	CPMS # _____
County <u>Jefferson</u>	
Description <u>Roundabout Lighting - Blue Lake Dr at Sicard Hollow Rd</u>	
Scope of work <u>Roadway Lighting Design</u>	
Length <u>0.20</u> miles	
Consultant <u>Volkert, Inc.</u>	

ROADWAY PLANS SHEET TITLE	NO OF SHEETS	ESTIMATED MAN-DAYS			
		ENGINEER		TECHNICIAN	
		SHEET	TOTAL	SHEET	TOTAL
TITLE SHEET	0.00	0.00	0.00	0.00	0.00
INDEX SHEET	0.00	0.00	0.00	0.00	0.00
INDEX TO SPECIAL/STD DRAWINGS	0.00	0.00	0.00	0.00	0.00
GEOMETRIC LAYOUT/SURVEY CONTROL	0.00	0.00	0.00	0.00	0.00
PROJECT NOTE SHEET (Project)	0.00	0.00	0.00	0.00	0.00
PROJECT NOTE SHEET (TCP)	0.00	0.00	0.00	0.00	0.00
PROJECT NOTE SHEET (Signage)	0.00	0.00	0.00	0.00	0.00
PROJECT NOTE SHEET (Signals)	0.00	0.00	0.00	0.00	0.00
PROJECT NOTE SHEET (ITS)	0.00	0.00	0.00	0.00	0.00
PROJECT NOTE SHEET (Lighting)	1.00	0.13	0.13	0.13	0.13
PROJECT NOTE SHEET (Traffic Loops)	0.00	0.00	0.00	0.00	0.00
LIGHTING LEGEND & ABBREVIATIONS	0.50	0.13	0.07	0.13	0.07
LIGHTING DESIGN CRITERIA	0.50	0.13	0.07	0.07	0.04
SUMMARY SHEET					
Main Summary	1.00	0.25	0.25	0.25	0.25
SUMMARY BOX SHEETS					
Roadway Drainage (non-culvert)	0.00	0.00	0.00	0.00	0.00
Culvert Extension, New Culvert	0.00	0.00	0.00	0.00	0.00
Bridge Culvert Extension, New Bridge Culvert	0.00	0.00	0.00	0.00	0.00
Guardrail/End Anchors	0.00	0.00	0.00	0.00	0.00
Slope Paving (Under Bridges)	0.00	0.00	0.00	0.00	0.00
Side Drain Pipe	0.00	0.00	0.00	0.00	0.00
Signing	0.00	0.00	0.00	0.00	0.00
Base & Pavement	0.00	0.00	0.00	0.00	0.00
Bridge	0.00	0.00	0.00	0.00	0.00
Striping & Pavement Markings	0.00	0.00	0.00	0.00	0.00
Curb & Gutter	0.00	0.00	0.00	0.00	0.00
Bridge End Slabs	0.00	0.00	0.00	0.00	0.00
Roadway Lighting Schedules	1.00	0.25	0.25	0.50	0.50
Signals	0.00	0.00	0.00	0.00	0.00
ITS	0.00	0.00	0.00	0.00	0.00
Sidewalk	0.00	0.00	0.00	0.00	0.00
Slope Paving (Ditches)/Ditch Summary	0.00	0.00	0.00	0.00	0.00
Concrete Safety Barrier	0.00	0.00	0.00	0.00	0.00
Retaining Wall	0.00	0.00	0.00	0.00	0.00
Misc. Boxes	0.00	0.00	0.00	0.00	0.00
Erosion Control	0.00	0.00	0.00	0.00	0.00
Removal Items	0.00	0.00	0.00	0.00	0.00
Utility Relocation	0.00	0.00	0.00	0.00	0.00

ROADWAY PLANS SHEET TITLE	NO OF SHEETS	ESTIMATED MAN-DAYS			
		ENGINEER		TECHNICIAN	
		SHEET	TOTAL	SHEET	TOTAL
TRAFFIC CONTROL					
Sequence of Construction	0.00	0.00	0.00	0.00	0.00
Summary & Items	0.00	0.00	0.00	0.00	0.00
Typical Section Sketches	0.00	0.00	0.00	0.00	0.00
Layout Sheets (signs, devices, shifts, etc.)	0.00	0.00	0.00	0.00	0.00
Special Drawings	0.00	0.00	0.00	0.00	0.00
LIGHTING					
Lighting Layout Sheets	1.00	0.25	0.25	0.50	0.50
Single Line Diagrams	1.00	0.50	0.50	0.50	0.50
Voltage Drop Calculations			0.25		0.00
Lighting Calculations (Photometrics)			1.50		0.00
Photometric results	1.00	0.13	0.13	0.13	0.13
Special Details	2.00	0.50	1.00	0.25	0.50
Soils & Passive Pressure (by others if req'd)			0.00		0.00
UTILITY COORDINATION					
Service Point Site Visit			0.50		0.00
Railroad coordination			0.00		0.00
			0.00		0.00
MEETINGS AND REVIEW COMMENTS					
Preliminary			1.00		1.00
90%			0.50		0.50
Final			0.25		0.50
Cost Estimates					
Design Hearing			0.50		0.25
			0.00		0.00
SUB-TOTAL	9.00		7.15		4.87
10% Supervision			0.72		
TOTALS	9.00		7.15		4.87

MEMORANDUM

**TO: Christopher Brady, P.E.
City Engineer
City of Vestavia Hills**

**FROM: Jennifer Brown, P.E., RSP
David Coggin, P.E.**

DATE: December 18, 2020

**SUBJECT: Sicard Hollow Road at Blue Lake Drive and Cahaba Heights Road
Proposed Roundabout
Vestavia Hills, AL
SA #20-0098**

Purpose

The Regional Planning Commission of Greater Birmingham (RPCGB) administers the Advanced Planning, Programming, and Logical Engineering (APPLE) program. In June of 2019, Sain Associates completed the Vestavia Hills Traffic Operations APPLE Study (Phase 1). This study recommended a roundabout at the Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road intersection in Vestavia Hills, Alabama. Figure 1 shows a conceptual improvement map of the recommended roundabout from the Vestavia Hills Traffic Operations APPLE Study (Phase 1).

In May 2020, the City of Vestavia Hills contracted with Sain Associates to perform further due diligence for the proposed roundabout. The purpose of this memorandum is to summarize the additional traffic operations analysis of the proposed roundabout. This memorandum includes:

- Consideration of nearby proposed developments,
- Identification of impacts that the proposed developments may have on the previous recommendation of a roundabout, and
- Recommendations for improvements that may be necessary to mitigate any impacts.

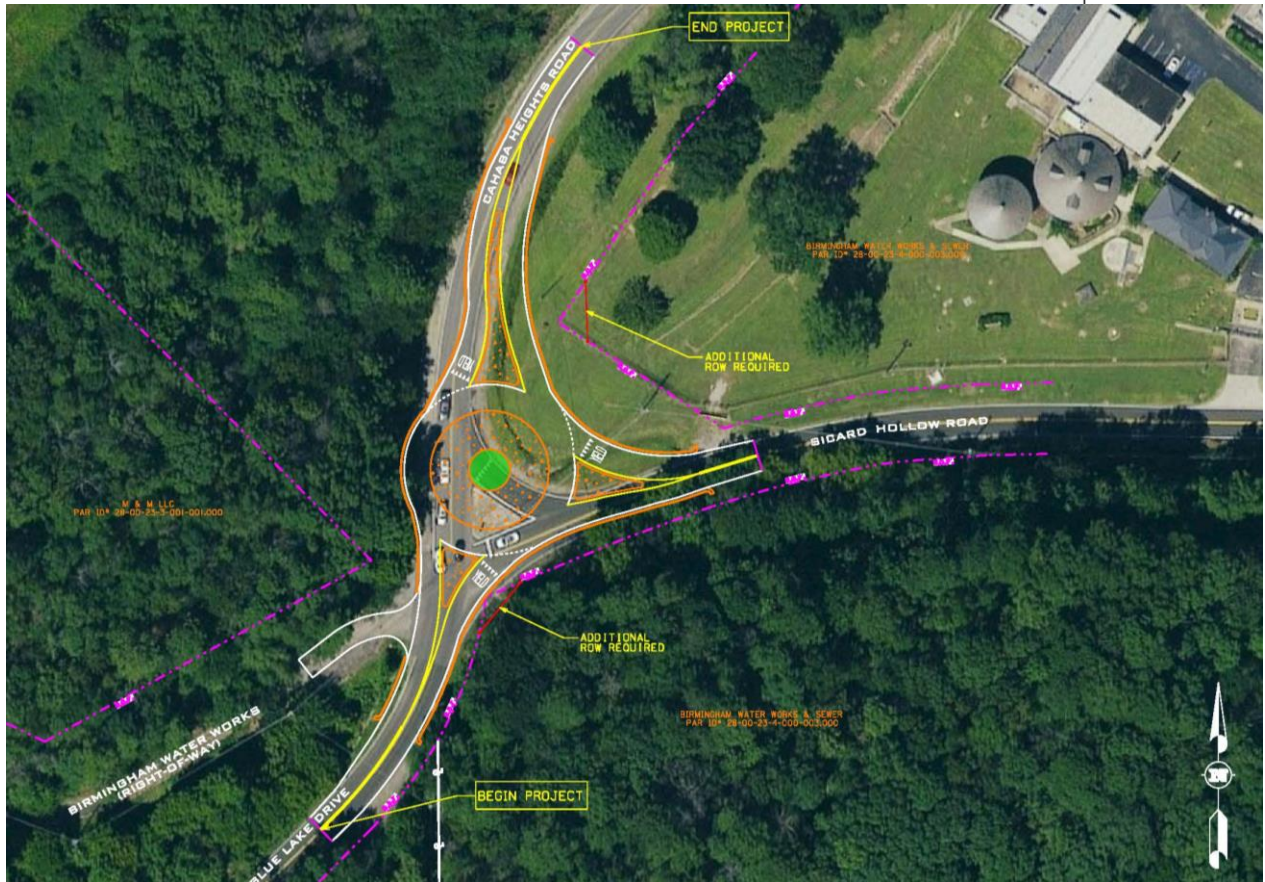


Figure 1: Roundabout Concept from Vestavia Hills Traffic Operations APPLE Study (Phase 1)

Existing Conditions

Blue Lake Road/Cahaba Heights Road and Sicard Hollow Road are classified as two-lane major collectors with speed limits of 35 MPH. The intersection is unsignalized and has four legs including a Birmingham Water Works access. The intersection serves as a hub for access between three areas: Cahaba Heights, the Colonnade and Patchwork Farms, and Liberty Park.



Photo 1: View of the Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road Intersection

Traffic Data

24-hour turning movement counts were collected at the study intersection on Wednesday, February 6, 2019. The morning peak hour occurs between 7:15 AM and 8:15 AM, while the afternoon peak hour occurs between 4:30 PM and 5:30 PM. Table 1 shows the peak hour traffic volumes at the intersection.

Table 1: Existing Peak Hour Traffic Volumes and Heavy Vehicle Percentages (2019)

Approach	Movement	Traffic Volume	
		AM Peak Hour	PM Peak Hour
Blue Lake Drive Northbound	Through	597	464
	Right	80	256
Cahaba Heights Road Southbound	Left	92	184
	Through	253	320
Sicard Hollow Road Westbound	Left	230	90
	Right	272	79

Existing Documents and Adjacent Projects

Several existing documents and nearby planned projects were reviewed and evaluated for impacts associated with the intersection of Sicard Hollow Road and Blue Lake Drive. This section also contains discussion regarding the methodology used to integrate impacts into the future conditions traffic analysis of this memorandum.

Vestavia Hills Traffic Operations APPLE Study – Phase 1 (June 2019)

Sain Associates provided an advanced planning report to the City of Vestavia Hills as a part of the RPCGB's APPLE program in June 2019. The report entitled Vestavia Hills Traffic Operations Study (Phase 1) documented nine study intersections for traffic operations and safety analysis. Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road was included as one of the study intersections. 24-hour turning movement counts, which are shown in Table 1, were collected at the intersection on Tuesday, February 6, 2019. The following analysis tasks were performed as a part of the study:

- Capacity analysis,
- Signal warrant,
- Sight distance measurements,
- Curve Analysis Reporting Services (CARS) runs, and
- Crash data analysis.

The results from each analysis task are summarized in Table 2. Refer to the Vestavia Hills Traffic Operations Study (Phase 1) document submitted in June 2019 for further details.

Table 2: Analysis Results Summary from Vestavia Hills Traffic Operations Study (Phase 1)

Analysis Type	Result
Capacity Analysis	See Tables 3 – 5
Signal Warrant	Not warranted with 2019 volumes.
Sight Distance Measurements	Required intersection sight distance (ISD) for 35 MPH (390') not met from Sicard Hollow westbound stop line. Looking northbound on Cahaba Heights Road, there is 350' of ISD. Looking southbound on Blue Lake Drive, there is 305' of ISD.
CARS Runs	The advisory speed traveling northbound along Blue Lake Drive is 25 MPH, while the advisory speed traveling southbound along Cahaba Heights Road is 20 MPH.
Crash Data Analysis	No conclusive trends were established due to limited sample size.

Several scenarios were included in the capacity analysis including existing volumes with existing geometry, existing volumes with a traffic signal, and existing volumes with a roundabout. The results can be found in Tables 3 – 5.

Table 3: Existing Peak Hour LOS at Sicard Hollow Road and Blue Lake Drive/Cahaba Heights Road (2019)

Approach (Existing Conditions)	AM LOS	PM LOS
	Left/Through/Right	Left/Through/Right
Blue Lake Drive – Northbound	A	A
Cahaba Heights Road – Southbound	A	A
Driveway – Eastbound	N/A*	N/A*
Sicard Hollow Road – Westbound	F	F

*No volume recorded on eastbound approach.

Table 4: Peak Hour LOS with Signalization (2019)

Approach (Signalized)	AM Peak LOS		PM Peak LOS	
	Left	Through/Right	Left	Through/Right
Blue Lake Drive – Northbound		D		B
Cahaba Heights Road – Southbound	B	B	A	A
Driveway – Eastbound		N/A*		N/A*
Sicard Hollow Road – Westbound		F		C

*No volume recorded on eastbound approach.

Table 5: Peak Hour LOS with Roundabout

Type of Roundabout	Blue Lake Drive – NB		Cahaba Heights Road – SB		Driveway – EB		Sicard Hollow Road – WB		Roundabout LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1-Lane by 1-Lane	B	B	A	A	B	B	E	A	C	B
1-Lane by 2-Lanes	A	B	A	A	A	A	B	A	A	A
2-Lanes by 1-Lane	A	A	A	A	A	A	C	A	B	A
2-Lanes by 2-Lanes	A	A	A	A	A	A	B	A	A	A

*Analysis includes 2019 traffic volumes grown 1% annually for 5 years at the request of the City.

Ultimately, a roundabout was recommended for the intersection due to its operational and safety benefits. With the installation of a traffic signal, the sight distance concerns would not be mitigated without realigning Cahaba Heights Road and Blue Lake Drive.

Liberty Park Traffic Study (February 2017)

In February 2017, Atkins provided a traffic impact study entitled Liberty Park Traffic Study for Liberty Park Joint Venture, LLP. The study performed trip generation for planned development throughout Liberty Park and included traffic data collected in September 2016.

The Liberty Park Traffic Study methodology included the following assumptions:

- All new traffic within Liberty Park is based on new or intercept trips per ITE *Trip Generation Manual*.
- New trip distribution for proposed development was based on the Birmingham Area Travel Demand Model.
- No travel demand modeling was performed with the new connection in place between Liberty Parkway and Sicard Hollow Road (Liberty Park Town Center Access).
- 12% of proposed residential development new trips were assigned to the Sicard Hollow Road at Liberty Park Town Center Access intersection. All proposed single-family residential new trips assigned to Overton Road South, which amounts to 30% of all new trips from proposed residential developments, were diverted to the Sicard Hollow Road access instead.
- 1% of all new trips for proposed commercial development were assigned to the Sicard Hollow Road access.
- An aggressive growth rate was used on Sicard Hollow Road to account for a potential Cahaba Beach Road to US-280 connection. This is evident in the projected 2030 peak hour volumes included in the document.

The Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road intersection was included for data collection in the Liberty Park Traffic Study. However, the intersection was not included in traffic analysis or recommendations. Turning movement counts were performed at this location on November 1, 2016, and 48-hour tube counts were collected along Sicard Hollow Road just west of Cahaba Beach Road on September 27 and 28, 2016. The peak hour volumes from both data collection efforts are summarized in Tables 6 and 7. The daily traffic volumes on September 27, 2016 and September 28, 2016 were 4,989 vehicles and 4,812 vehicles, respectively.

Table 6: Peak Hour Traffic Volumes on Sicard Hollow Road (2016)

Tube Count Location (Date)	AM Peak Hour		PM Peak Hour	
	Eastbound	Westbound	Eastbound	Westbound
Sicard Hollow Road east of Cahaba Beach Road (9/27/2016)	168	410	375	160
Sicard Hollow Road east of Cahaba Beach Road (9/28/2016)	183	426	340	176

Table 7: Peak Hour Volumes at Sicard Hollow Rd and Blue Lake Dr/Cahaba Heights Rd Intersection (2016)

Approach	Movement	Traffic Volume	
		AM Peak Hour	PM Peak Hour
Blue Lake Drive Northbound	Through	645	503
	Right	80	232
Cahaba Heights Road Southbound	Left	94	202
	Through	207	329
Sicard Hollow Road Westbound	Left	157	69
	Right	267	108

The Liberty Park Traffic Study provides future volumes for two horizon years, 2018 and 2030. The document designates certain development to be open to traffic by these horizon years. Table 8 lists the new trips generated by the proposed development within Liberty Park according to the Liberty Park Traffic Study. Table 9 shows the estimated 2030 peak hour volumes at the proposed Sicard Hollow Road intersection with the Liberty Park Town Center Access, while Table 10 shows the LOS for the same intersection. Ultimately, the study's recommended traffic control at this intersection is a signalized intersection and turn lanes.

Table 8: New Trips from Proposed Development - Liberty Park Traffic Study

Time Period	Proposed Development New Trips by Horizon Year		
	2018	2030	Total
AM Peak Hour	13	339	352
PM Peak Hour	17	393	410
Daily	160	4,197	4,357

Table 9: Peak Hour Volumes at Proposed Sicard Hollow Road at Liberty Park Town Center Access (2030)

Approach	Movement	Year 2030 Peak Hour Volume	
		AM Peak	PM Peak
Sicard Hollow Road Eastbound	Left	94	254
	Through	314	821
Sicard Hollow Road Westbound	Through	1054	376
	Right	27	76
Liberty Park Town Center Access	Left	77	43
	Right	250	150

Table 10: Peak Hour LOS at Proposed Sicard Hollow Road and Liberty Park Town Center Access (2030)

Approach	Year 2030	
	AM Peak*	PM Peak*
Sicard Hollow Road Eastbound	A	A
Sicard Hollow Road Westbound	B	A
Liberty Park Town Center Access	C	A
Intersection	B	A

*Analysis includes the installation of recommended improvements.

The Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road intersection was not included in traffic analysis or recommendations within the Liberty Park Traffic Study. At the proposed intersection of Sicard Hollow Road and Liberty Park Town Center Access, the Liberty Park Traffic Study recommends the following improvements by 2030:

- Intersection
 - Install a traffic signal
- Sicard Hollow Road Eastbound Approach
 - Install a left turn lane
- Sicard Hollow Road Westbound Approach
 - Install a right turn lane
- Liberty Park Town Center Southbound Approach
 - Install a left turn lane
 - Install a right turn lane

The future conditions traffic analysis section contains methodology and assumptions on how the findings of the Liberty Park Traffic Study were incorporated into analysis for this memorandum.

Cahaba Beach Road – US-280 Connector

Cahaba Beach Road is a two-lane local roadway from US-280 to Sicard Hollow Road. However, the road is narrow, partially unpaved, not continuous, and crosses the Little Cahaba River watershed. An iron bridge no longer sufficient for vehicle travel exists at its crossing of the Little Cahaba River. Cahaba Beach Road provides access to several single-family residential homes with an average annual daily traffic (AADT) volume of less than 100 vehicles per day in most locations along the roadway. The Little Cahaba River also presents environmental concerns for any major upgrades to the roadway.

The Regional Planning Commission of Greater Birmingham (RPCGB) Transportation Improvement Plan (TIP) for fiscal years 2020-2023 was finalized in September of 2019 and includes a project (sponsored by Shelby County) to extend Cahaba Beach Road from

Swan Drive (CR-346) to Sicard Hollow Road. This project would require a bridge over the Little Cahaba River. Per the TIP this project has a construction start date of November 4, 2021; however, in 2018 The City of Birmingham passed a resolution opposing the project and the City of Vestavia Hills passed a resolution opposing proposed options. There has been no forward progression of the proposed project since 2018 and there is a considerable amount of opposition from private citizens and organizations like the Cahaba River Society. Therefore, the proposed extension of Cahaba Beach Road is not included in the analysis summarized in this memorandum.

Grants Mill Road

Grants Mill Road is classified as a major collector and connects State Route 119 in Leeds to US-78 (State Route 4) in Irondale. Other significant intersecting roads include I-459, Old Leeds Road, Overton Road, Sicard Hollow Road, and Rex Lake Road. There has been discussion of a potential extension or widening on the southern side of this roadway. This could affect traffic volumes on Sicard Hollow Road, because it intersects Grants Mill Road approximately 6.7 miles east of Blue Lake Drive.

If Grants Mill Road was widened south of Sicard Hollow Road or extended to Dunnavant Valley Road (CR-41) in Shelby County, traffic volumes could increase along Sicard Hollow Road. There are no programmed projects on Grants Mill Road south of Sicard Hollow Road in the Birmingham Metropolitan Planning Organization's 2020 – 2023 Transportation Improvement Plan (TIP) or the 2045 Long Range Transportation Plan (LRTP). Considering how large of a project widening or extending Grants Mill Road would be, it is unlikely that either will occur within the horizon year of this study.

Future Conditions Traffic Analysis

Our future conditions traffic analysis will evaluate how the additional information provided within the Liberty Park Traffic Study might affect the recommendations of the Vestavia Hills Traffic Operations Study (Phase 1) at the intersection of Sicard Hollow Road and Blue Lake Drive/Cahaba Heights Road. To establish the future conditions for further analysis at the intersection, the 2019 turning movement volumes collected during the APPLE Study were added to the new trips generated by the proposed development and provided in the Liberty Park Traffic Study. Figure 2 shows a descriptive equation to summarize how the future traffic volumes were calculated. The 2019 turning movement counts can be found in Table 1, and the new trips generated by proposed development can be found in Table 8.



Figure 2: Future Conditions Traffic Volumes Description

The resulting future conditions traffic volumes are shown in Table 11.

Table 11: Future Conditions Traffic Volumes (2030)

Approach	Movement	Traffic Volume	
		AM Peak Hour	PM Peak Hour
Blue Lake Drive Northbound	Through	597	464
	Right	129	423
Cahaba Heights Road Southbound	Left	149	304
	Through	253	320
Sicard Hollow Road Westbound	Left	343	156
	Right	405	136

Methodology

Future conditions traffic volumes were calculated as described in Figure 2. The growth in traffic volumes represented by the new trips generated by the proposed Liberty Park development encompasses a reasonable growth rate that would typically be used to grow existing traffic volumes in a typical traffic study. The new trips generated represents greater than 25% growth in peak hour traffic volume at the intersection by the horizon year 2030. For this reason, no additional growth rate was used to calculate the future conditions traffic volumes used in this memorandum's traffic analysis. Additionally, several assumptions must be made:

- The trip generation, assignment, and distribution performed in the Liberty Park Traffic Study was accepted for the purposes of traffic analysis performed in this memorandum. The process used to develop some of this information is not immediately clear in the Liberty Park Traffic Study document.
- The Liberty Park Traffic Study identified new trips from the proposed Liberty Park developments that were assigned to Sicard Hollow Road west of its intersection with the Liberty Park Town Center Access. These new trips on Sicard Hollow Road were distributed through the intersection of Sicard Hollow Road at Blue Lake Drive and Cahaba Heights Road based on existing turning movement percentages from the 2019 peak hour turning movement counts.

- It is assumed that the land use and development plans have not changed from what is described and used in trip generation in the Liberty Park Traffic Study.
- The turning movement counts from the Liberty Park Traffic Study estimated for horizon year 2030 at the proposed Sicard Hollow Road at Liberty Park Town Center Access were not used in future conditions traffic analysis for this memorandum as an aggressive annual growth rate was applied to Sicard Hollow Road to account for the proposed extension of Cahaba Beach Road (see discussion on page 8).
- Travel demand modeling was not performed with the link connecting Liberty Parkway and Sicard Hollow Road. Existing travel patterns could change after this new connection is established between Liberty Parkway and Sicard Hollow Road. In the Liberty Park Traffic Study, there were no existing traffic volumes diverted through the new connection to Sicard Hollow Road.

Traffic Volume Growth Evaluation

This section contains detailed discussion about the future conditions traffic volume methodology and how it compares to other transportation planning efforts. Supplemental data is provided to contextualize the assumptions made for the future conditions traffic analysis. Estimating future traffic volumes is not an exact science, and the landscape of cities can change quickly after a study is performed. In the transportation planning process, it is typical to utilize one of the following methods to estimate traffic volume growth:

1. Assume a straight-line growth trend in the form of an annual growth rate. The annual growth rate is typically based on historical traffic data or previous transportation planning efforts in the area. In theory, this accounts for all “background” growth that could potentially affect the study area prior to the horizon year. This method is typically more useful for large transportation planning efforts or areas adjacent to a large amount of undeveloped land.
2. Perform trip generation for all known proposed development surrounding the study area by the methods described in the *ITE Trip Generation Manual*. This method is typically more useful in locations that are essentially fully developed apart from specific known developments.
3. Use a combination of methods #1 and #2. Account for known developments by performing trip generation and add a straight-line annual growth rate to existing volumes for a conservative estimation of future “background” traffic volumes.

The Liberty Park Traffic Study utilized method #2 to estimate future traffic volumes in horizon year 2030. A qualitative examination of any growth rate as “aggressive” or “modest” is speculative in nature, but a comparison between methods can be performed and compared to growth rates in other locations. An annual growth rate equivalent can be back-calculated from the number of new trips generated by the proposed Liberty Park development. Table 12 shows the comparison of a four-year period

of historical data and the equivalent growth rate calculated using the new trips generated in the Liberty Park Traffic Study.

ALDOT's Traffic Data website was used to study how historic growth trends compare to the proposed development plans in Liberty Park. Using 2019 volumes with the new trips generated by proposed development in Liberty Park accounts for aggressive growth on Sicard Hollow Road that outpaces historical traffic data trends since 2015 to 2019. This also accounts for modest growth from Blue Lake Drive and Cahaba Heights Road, which falls in line with historic traffic data trends from 2015 to 2019 on Blue Lake Drive. The historic traffic data trend on Cahaba Heights Road reveals a slight decline in traffic volumes from 2015 to 2019.

Table 12: Growth Rate Comparison – Peak Hours

Roadway	Annual Growth Rate* (2015 – 2019)	Equivalent Annual Growth Rate* represented by New Trips from Liberty Park Development (2020 – 2030)
Sicard Hollow Road	2.8%	5 – 7%
Blue Lake Drive	3.3%	1 – 3%
Cahaba Heights Road	-1.2%	1 – 3%

*per year average

Figure 3 shows a visual representation of how each growth method would be applied to this study.

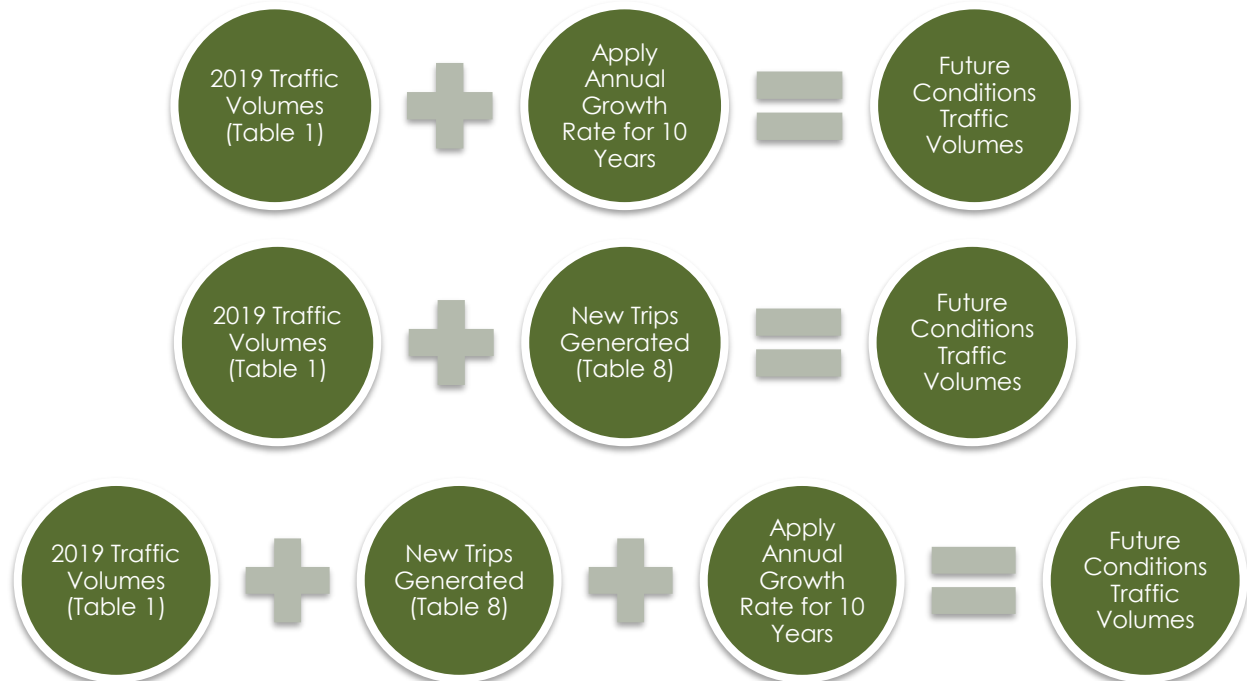


Figure 3: Descriptive Equation of Method #1 (Top), Method #2 (Middle), Method #3 (Bottom)

To summarize, using a background growth rate in addition to the new trips generated by Liberty Park development (Method #3) would be considered a very conservative projection. Using a straight-line trend annual growth rate (Method #1) would likely yield lower traffic volumes than the volumes used for future conditions traffic analysis in this memorandum. The future conditions traffic volumes (Method #2) used in this memorandum is also considered conservative, based on historical traffic data trends and growth rates used across the Birmingham metropolitan area.

Capacity Analysis

Sain Associates conducted a capacity analysis for vehicular traffic at the study intersection using ALDOT's Capacity Analysis for Planning of Roundabouts tool. Traffic capacities are expressed as levels of service (LOS) ranging from "A" (free-flow conditions) to "F" (very congested conditions). Generally, LOS "C" is desirable, while LOS "D" is considered acceptable during peak hours of traffic flow. Level of service criteria for unsignalized intersections is stated in terms of average control delay. Control delay is defined as the total elapsed time from a vehicle joining the queue until its departure from the stopped position at the head of the queue. The criteria for each level of service are cited in the Table 13.

Table 13: Unsignalized LOS Delay

Level of Service	Average Control Delay (seconds per vehicle)
A	0 to 10
B	> 10 to 15
C	> 15 to 25
D	> 25 to 35
E	> 35 to 50
F	> 50

Table 14 shows a breakdown of the levels of service (LOS) during the 2030 AM and PM peak hours based on projected future post-development volumes with a single-lane roundabout installed without right turn bypass lanes. During the AM peak hour, the heavy northbound through movement volume conflicts with the heavy westbound approach volume to cause LOS F on the Blue Lake Drive northbound approach. During the PM peak hour, the heavy northbound approach volume conflicts with the heavy southbound left turn volume, causing LOS F on the northbound approach.

Table 14: Future Conditions LOS with Single-Lane Roundabout – No Bypass Lanes (2030)

Approach	2030 AM Peak LOS	2030 PM Peak LOS
Blue Lake Drive Northbound	B	F
Cahaba Heights Road Southbound	B	B
Sicard Hollow Road Westbound	F	A
Intersection LOS	F	E

Table 15 shows a breakdown of the levels of service (LOS) during the 2030 AM and PM peak hours based on projected future post-development volumes with a single-lane roundabout installed with the recommended right turn bypass lanes on the westbound and northbound approaches. All approaches register satisfactory LOS. The issues described with a single-lane roundabout without bypass lanes are mitigated by separating the through and left turn lanes from the right turn lanes at the yield point. Instead of only one car per approach looking for an acceptable gap in traffic at any given time, the bypass lane allows one through or left turning car and one right turning car to look for acceptable gaps simultaneously. This results in less vehicle delay and a better LOS at each approach.

Table 15: Future Conditions LOS with Single-Lane Roundabout and Recommended Bypass Lanes (2030)

Approach	2030 AM Peak LOS	2030 PM Peak LOS
Blue Lake Drive Northbound Through/Left	B	B
Blue Lake Drive Northbound Right Turn Bypass Lane	A	B
Cahaba Heights Road Southbound	B	B
Sicard Hollow Road Westbound Through/Left	B	A
Sicard Hollow Road Westbound Right Turn Bypass Lane	C	A
Intersection LOS	B	B

Recommendations

As a result of the document review and traffic analysis, Sain Associates recommends the following improvements:

- Construct a single-lane roundabout at the intersection of Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road with right turn bypass lanes on the northbound and westbound approaches.

Roundabout Service Life

The LOS for each approach on a single-lane roundabout with right turn bypass lanes at the intersection of Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road is projected to be satisfactory in the 2030 (Table 15). In order to conservatively examine the possibility of additional growth, a service life or failure criteria can be estimated by calculating the untapped capacity of the proposed roundabout. It is typical in transportation planning to use a 20-year window in future capacity analysis, which would account for growth beyond the 2030 horizon year used for analysis in the Liberty Park Traffic Study and this memorandum.

In addition to the conservative future conditions traffic volumes in Table 11, the annual growth rates in Table 16 for existing traffic volumes would need to be sustained for a 20-year period (2020 to 2040) for any approach of the proposed roundabout to reach LOS F during peak hours.

Table 16: 20-Year Failure Criteria of Proposed Roundabout by Annual Growth Rate

What additional growth could be accommodated by the proposed roundabout before any approach reaches LOS F during peak hours?	
Approach	Annual Growth Rate (2020 to 2040)
Sicard Hollow Road Westbound	0.5% per year for 20 years
Blue Lake Drive Northbound	1.0% per year for 20 years
Cahaba Heights Road Southbound	1.0% per year for 20 years

Signalized Intersection Performance

One alternative to a roundabout at this location is a signalized intersection. However, preliminary capacity analysis indicates that the following improvements would likely be required to reach comparable LOS to the single-lane roundabout with right turn bypass lanes:

- Install a traffic signal;
- Widen the Sicard Hollow Road westbound approach to include two left turn lanes and a right turn lane;

- Widen Blue Lake Drive to four lanes, with two lanes in each direction;
- Widen Cahaba Heights Road to two northbound travel lanes;
- Install a left turn lane on Cahaba Heights Road southbound approach to Sicard Hollow Road;
- To avoid uneven queuing, the widening on Blue Lake Drive and Cahaba Heights Road would likely need to continue to US-280 and into Cahaba Heights, respectively; and
- Due to the poor geometry at the intersection, Blue Lake Drive and Cahaba Heights Road would need to be realigned in addition to all widening mentioned above.


A project including each of these improvements would come at a cost that far exceeds the cost of the recommended single-lane roundabout with right turn bypass lanes. Additionally, a signalized intersection would likely experience more severe crashes than the proposed roundabout.

Supplemental Materials

Single-Lane Roundabout Capacity Analysis – No Right Turn Bypass Lanes

Capacity Analysis for Planning of Roundabouts

Output Worksheet


Project Name:	Sicard Hollow at Blue Lake - Existing + New Trips (AM)	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#20-0098	
Location	Vestavia Hills, Alabama	
Date	December 10, 2020	

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (East)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B	/	n/a	LOS B	/	n/a	LOS B	/	n/a	LOS F	/	n/a	LOS F	#DIV/0!
1.2	1 X 2	LOS A	/	n/a	LOS A	LOS A	n/a	LOS B	/	n/a	LOS B	LOS C	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A	/	n/a	LOS A	LOS A	n/a	LOS F	/	n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS B	LOS B	n/a	#DIV/0!	#DIV/0!

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	Sicard Hollow at Blue Lake - Existing + New Trips (PM)	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#20-0098	
Location:	Vestavia Hills, Alabama	
Date:	December 10, 2020	


Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (East)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B	/	n/a	LOS B	/	n/a	LOS F	/	n/a	LOS A	/	n/a	LOS E	#DIV/0!
1.2	1 X 2	LOS A	/	n/a	LOS A	LOS A	n/a	LOS E	/	n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A	/	n/a	LOS A	LOS B	n/a	LOS A	/	n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!

Proposed Roundabout Capacity Analysis – With Right Turn Bypass Lanes

Capacity Analysis for Planning of Roundabouts

Output Worksheet


Project Name:	Sicard Hollow at Blue Lake - Improved Existing + New Trips (AM)	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#20-0098	
Location:	Vestavia Hills, Alabama	
Date:	December 10, 2020	

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (East)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B		n/a	LOS B		n/a	LOS B		LOS A	LOS B		LOS C	LOS B	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS B		n/a	LOS B	LOS C	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS A	n/a	LOS F		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS B	LOS B	n/a	#DIV/0!	#DIV/0!

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	<i>Sicard Hollow at Blue Lake - Improved Existing + New Trips (PM)</i>	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#20-0098	
Location	<i>Vestavia Hills, Alabama</i>	
Date	December 10, 2020	

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (East)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS B		n/a	LOS B		n/a	LOS B		LOS B	LOS A		LOS A	LOS B	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS E		n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS B	n/a	LOS A		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!

Project No.	TBD
County	Jefferson
Description	Roundabout Lighting - Blue Lake Dr at Sicard Hollow Rd
Scope of Work	Roadway Lighting Design
Project Length	0.20 Miles
Consultant	Volkert, Inc.

Out-of-pocket Expenses (Roadway Plans)

TRAVEL COST					
Mileage Cost	Trips	Miles/Trip	\$/Mile	Total	
Site Visit with Power Company	1	12	\$0.585	\$ 7.02	
Site Visit Durung Design/Plan Reviews	1	12	\$0.585	\$ 7.02	
	0	0	\$0.585	\$ -	
	0	0	\$0.585	\$ -	
Total Mileage Cost				\$ 14.04	
Subsistence Cost					
	Days	# People	\$/Day	Total	
Travel allowance (6 hour trips)	0	0	\$11.25	\$ -	
Travel allowance (12 hour trips - meal provided by others)	0	0	\$20.00	\$ -	
Travel allowance (12 hour trips)	0	0	\$30.00	\$ -	
Travel allowance (overnight)***	0	0	\$75.00	\$ -	
				\$ -	
Total Subsistence Cost				\$ -	
Total Travel Cost				\$ 14.04	
PRINTING / REPRODUCTION COST					
Type of printing/reproduction	# of Sets	Sheets/Set	Total Sheets	Cost/Sheet	Total
QC set	1	9	9	\$ 0.39	\$ 3.51
Preliminary Submittal	3	9	27	\$ 0.39	\$ 10.53
90% Submittal	3	9	27	\$ 0.39	\$ 10.53
Final Submittal	1	9	9	\$ 0.39	\$ 3.51
				\$ 3.00	\$ -
Total Printing/Reproduction Cost				\$ 28.08	
Communication Cost (telephone, fax, etc.)				Total	
				\$ -	
Postage Cost (overnight, stamps, etc.)				Total	
				\$ 25.00	
Other (provide description on next line)				Total	
				\$ -	
Total Out-of-pocket Expenses				\$ 67.12	

Comments:

***You must have ALDOT approval for ANY overnight trips of less than 100 miles.

Advanced Planning Report for Vestavia Hills Traffic Operations APPLE Study (Phase 1) RPC Project No. 1289.32

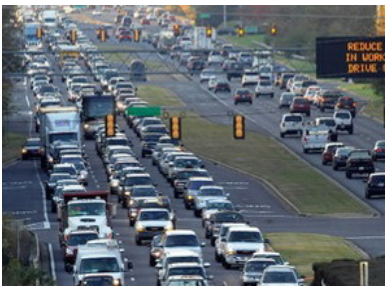
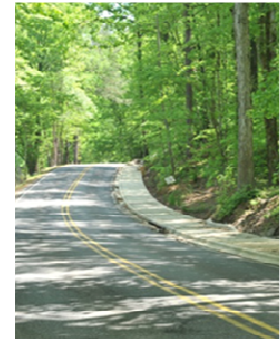
Prepared for
Regional Planning Commission of Greater Birmingham

DRAFT

June 17, 2019



VESTAVIA HILLS



SAIN
ASSOCIATES



ADMONITION

This document is exempt from open records, discovery or admission under Alabama Law and 23 U.S.C. §§ 148(h)(4) and 409). The collection of safety data is encouraged to actively address safety issues on regional, local, and site specific levels. Congress has laws, 23 U.S.C. § 148(h)(4) and 23 U.S.C. § 409 which prohibit the production under open records and the discovery or admission of crash and safety data from being admitted into evidence in a Federal or state court proceeding. This document contains text, charts, tables, graphs, lists, and diagrams for the purpose of identifying and evaluating safety enhancements in this region. These materials are protected under 23 U.S.C. §409 and 23 U.S.C. § 148(h)(4). In addition, the Supreme Court in *Ex parte Alabama Dept. of Trans.*, 757 So. 2d 371 (Ala. 1999) found that these are sensitive materials exempt from the Alabama Open Records Act.

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1 Introduction

This study was initiated by the City of Vestavia Hills through the Advanced Planning, Programming, and Logical Engineering (APPLE) program developed by the Regional Planning Commission of Greater Birmingham (RPCGB). The City requested professional planning assistance in evaluating traffic operations at several intersections within the City. The study involves the following nine (9) intersections:

1. Rocky Ridge Road at Dolly Ridge Road
2. Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road
3. Rocky Ridge Road at US-280
4. US-31 at Shades Crest Road
5. US-31 at Columbiana Road/I-65 Northbound Ramps
6. Columbiana Road at Shades Crest Road/Vestaview Lane
7. US-31 at Vestavia Plaza/City Hall
8. US-31 at Pizitz Drive/Vestavia Forest Place
9. Dolly Ridge Road at Gresham Drive

1.1 Purpose and Need of the Study

This study was undertaken to assess traffic operational improvements at several intersections in and around the City, specifically stemming from user complaints and the redistricting of several schools within the district. This document summarizes the following topics:

- Existing transportation system operational conditions and deficiencies,
- The process used to identify potential alternatives for improvement,
- The resulting alternatives that were developed from that process, and
- An evaluation of potential positive and negative impacts to the area and adjacent properties that may be associated with each improvement.

The purpose of this study is to identify feasible improvements and their potential impacts. If the City chooses to move forward with an improvement project, a more detailed Environmental Planning Study would be required for federally funded projects; however, the City may also fund any improvements in order to achieve a quicker timeline.

Some of the intersections included in this study need improvements to accommodate adjusted traffic demands and pedestrian access as a result of the redistricting of schools within the City. For these intersections, this study is specifically geared towards identifying improvements that can be implemented with an accelerated timeline before the school redistricting takes effect for the 2019-2020 school year. Long term

improvements were identified at various locations to provide additional context for daily traffic operations at the intersections.

1.2 Study Approach

This study involves an evaluation of the existing conditions and constraints of several intersections selected by the City to be a part of the study. Existing traffic data was collected and a capacity analysis of the existing conditions was prepared. All information was compiled and evaluated to define the needs of each intersection and identify constraints and opportunities for improvement. Field reviews were performed that consisted of observing peak hour traffic patterns and investigating the impacts of various improvement options.

Recommendations were developed and evaluated relative to their ability to address the purpose and need for the project. Recommendations for each intersection are included within its respective subsection of this report.

1.3 Background Information

The most influential driver of the purpose and need for this project is the redistricting of several city schools. Table 1 outlines the changes in school facility enrollment and capacity as estimated by Vestavia Hills City School District.

Table 1: Vestavia Hills City School District Facility Enrollment Before and After Redistricting

School	Current Grades	Enrollment	Capacity	New Grades	New Enrollment	New Capacity
East	K - 3 rd	770	779	K - 5 th	774	836
West	K - 3 rd	752	798	K - 5 th	769	874
Central	4 th - 5 th	769	646	None	None	None
Gresham/ Dolly Ridge	None	None	None	K - 5 th	735	836
Cahaba Heights	K - 5 th	429	437	K - 5 th	491	570
Liberty Park Elementary	K - 5 th	589	779	K - 5 th	613	779
Liberty Park Middle	6 th - 8 th	482	798	6 th - 8 th	479	798
Pizitz	6 th - 8 th	1149	1026	9 th	510*	1026**
Berry	None	None	None	6 th - 8 th	1199	1300

Source: Vestavia Hills City Schools Annual Reports 2013-2018 (www.vestavia.k12.al.us)

*Estimated based on 2017-2018 Vestavia Hills High School total enrollment

**Assumed previous Pizitz campus capacity would remain the same as 2017-2018

2 Traffic Analysis and Recommendations

Stakeholder input resulted in the following intersections and any specified focus areas associated with each location. Each subsection contains an operations analysis of the existing conditions for the year 2019 and recommendations for mitigating operational deficiencies. Traffic counts are included in Appendix A, and capacity analysis reports from Trafficware’s Synchro 10 software are included in Appendix B.

In the *Highway Capacity Manual* (2016), published by the Transportation Research Board, traffic capacities are expressed as levels of service (LOS) ranging from “A” to “F”. A detailed description of each level of service designation is included in Appendix C. Generally, LOS “C” is considered desirable, while LOS “D” is considered acceptable during peak hours of traffic flow.

2.1 Rocky Ridge Road at Dolly Ridge Road

Rocky Ridge Road is classified as a two-lane minor arterial with a speed limit of 35 MPH, and Dolly Ridge Road is classified as a two-lane major collector. The intersection is signalized and operates currently as a two-phase cycle running free at all times. Figure 1 displays aerial imagery of the intersection. Traffic counts were collected by Jefferson County on Tuesday, January 15, 2019, from 6:00 AM to 8:00 AM, 2:00 PM to 3:00 PM, and 4:30 PM to 6:00 PM. Analysis completed by Jefferson County and Sain Associates included a Synchro capacity analysis, trip generation estimates for added school traffic, and crash data analysis. According to the City, plans are in place to install sidewalks in the vicinity of the intersection. These plans were considered when making recommendations.



Figure 1: Aerial Imagery of the Rocky Ridge Road at Dolly Ridge Road Intersection

Analysis

Rocky Ridge Road is a heavily utilized roadway for commuters accessing US-280 and schools. Dolly Ridge Road connects Rocky Ridge Road on the western end to Cahaba River Road on the eastern end. Both Rocky Ridge Road approaches have left turn lanes. The trip generating land parcels that feed the eastbound approach to this intersection are fully built-out. The west leg of Dolly Ridge Road provides access to a CVS, a veterinarian office, an assisted-living facility, and a moderately-sized residential neighborhood. With its close proximity to Vestavia Hills High School and the new Dolly Ridge Elementary, the intersection is expected to be noticeably affected by the redistricting of schools. Table 2 displays the current level of service for each lane group. The numbers shown in parentheses indicate each lane group's delay per vehicle in seconds.

Table 2: Existing Lane Group LOS at Rocky Ridge Road and Dolly Ridge Road (2019)

Approach	AM LOS		School PM LOS		PM LOS	
	Left	Through/Right	Left	Through/Right	Left	Through/Right
Rocky Ridge Road – Northbound	A (5.7)	C (22.2)	A (5.6)	A (7.0)	A (7.3)	A (9.4)
Rocky Ridge Road – Southbound	D (41.5)	A (7.9)	A (6.8)	B (10.2)	A (9.1)	B (15.5)
Dolly Ridge Road – Eastbound	B (19.9)		B (14.5)		B (18.3)	
Dolly Ridge Road – Westbound	D (35.7)		B (19.3)		C (25.6)	

Table 3 shows the estimated additional trips induced by the opening of Dolly Ridge Elementary. Trip generation was completed based on turning movement counts from an existing Vestavia Hills elementary school and distributed by a shortest-path analysis using GIS software. Since Vestavia Hills does not employ a typical bus system, the *ITE Trip Generation Manual* trip rates for elementary schools (LUC 520) is not appropriate for this scenario. Further details of the trip generation methodology used in this study can be found in Section 2.9 and Appendix D. Table 4 contains the peak hour capacity analysis with the estimated added volume from the trip generation.

Table 3: Net Added Volume from Trip Generation

Approach	Net Added AM Trips			Net Added School PM Trips		
	Left	Through	Right	Left	Through	Right
Rocky Ridge Road – Northbound	0	0	302	0	0	82
Rocky Ridge Road – Southbound	154	0	0	137	0	0
Dolly Ridge Road – Eastbound	0	5	0	0	16	0
Dolly Ridge Road – Westbound	119	2	196	139	19	146

Table 4: Lane Group LOS with Trip Generation Volumes Added (2019)

Approach	AM LOS		School PM LOS		PM** LOS	
	Left	Through/Right	Left	Through/Right	Left	Through/Right
Rocky Ridge Road – Northbound	A (6.2)	F (122.7)	A (7.6)	B (11.2)	A (7.3)	A (9.4)
Rocky Ridge Road – Southbound	F (>300)*	A (8.6)	D (38.8)	B (16.9)	A (9.1)	B (15.5)
Dolly Ridge Road – Eastbound	C (21.2)		B (17.4)		B (18.3)	
Dolly Ridge Road – Westbound	F (>300)*		F (89.5)		C (25.6)	

*Computed delay in seconds exceeds a meaningful value

**School trip generation estimates do not affect PM LOS, only AM and School PM LOS.

The crash data analysis included ten (10) crashes from 2016 through 2018. 40% of crashes involved angle collisions, and an additional 40% of the crashes were sideswipe crashes. There were two safety issues observed at this intersection that could be contributing to angle or sideswipe crashes. First, the diagonal span-wire arrangement leads to poor signal head visibility for drivers as they enter the intersection. This is especially true for drivers attempting to make a permissive left turn from either Rocky Ridge Road approach. Second, the access point density in the segment just north of the intersection on Rocky Ridge Road is unnecessarily high. The potential for drivers to use the access points as cut-throughs during peak hours is high, which presents a safety issue for gas station customers walking to and from the gas pumps. One access is striped as a right-in, right-out configuration, which is generally less effective at preventing incorrect movements than raised channelizing islands. Figure 2 shows a view of the intersection, its span-wire arrangement, and the right-in, right-out access point to the gas station.



Figure 2: View from the northeast corner of the Rocky Ridge Road at Dolly Ridge Road intersection

Recommendations

Considering the added volumes and the existing operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. Add a left turn phase for the Rocky Ridge Road northbound and southbound approaches. A flashing yellow arrow (FYA) signal head arrangement is recommended for both protected-permissive left turn conditions. Base signal timings with the added phase are included in Appendix E. The timings should be monitored after school begins, and any necessary adjustments should be made.
2. In conjunction with adding left turn phases, the existing span-wire arrangement should be converted to a box arrangement. Long term recommendations below should be considered in the placement of any new signal poles.
3. Include pedestrian timings, signal heads, and crosswalks in accordance with the plans for sidewalks in the area.
4. Install a raised channelizing island at the right-in, right-out gas station driveway along Rocky Ridge Road just north of the intersection.

Long Term Recommendations:

5. Install right turn lanes on the Rocky Ridge Road northbound and Dolly Ridge Road westbound approaches. Both turn lanes should be as long as feasible to ensure effectiveness in improving traffic operations at the intersection.

Table 5 shows the capacity analysis results when accounting for short term recommendations (no turn lane additions) and added volumes from trip generation. Table 6 shows the capacity analysis results when accounting for both short term and long term recommendations and added volumes from trip generation. Inclusion of pedestrian phases will impact levels of service for other movements.

Table 5: Lane Group LOS with Short Term Recommendations Implemented (2019)

Approach	AM LOS		School PM LOS		PM LOS	
	Left	Through/ Right	Left	Through/ Right	Left	Through/ Right
Rocky Ridge Road – Northbound	A (9.7)	F (258.9)	B (10.5)	D (43.5)	A (3.6)	B (16.3)
Rocky Ridge Road – Southbound	F (211.9)	B (15.1)	D (29.6)	C (25.9)	A (4.6)	B (15.1)
Dolly Ridge Road – Eastbound	C (30.0)		B (16.6)		B (19.8)	
Dolly Ridge Road – Westbound	F (297.8)		D (52.3)		C (33.7)	

Table 6: Lane Group LOS with Short Term and Long Term Recommendations Implemented (2019)

Approach	AM LOS			School PM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Rocky Ridge Road – Northbound	A (5.3)	D (37.8)	A (4.3)	A (5.3)	C (20.8)	A (4.2)	A (4.3)	B (13.8)	A (3.2)
Rocky Ridge Road – Southbound	F (81.0)	A (9.5)		A (8.4)	B (16.6)		A (4.8)	B (13.4)	
Dolly Ridge Road – Eastbound	C (26.5)			B (16.0)			B (18.9)		
Dolly Ridge Road – Westbound	E (71.3)		C (26.6)	D (39.0)		A (5.6)	C (27.8)		A (7.2)

2.2 Sicard Hollow Road at Blue Lake Drive/Cahaba Heights Road

Blue Lake Road and Sicard Hollow Road are both classified as two-lane major collectors with speed limits of 35 MPH. The intersection is unsignalized and has four legs. The intersection serves as a hub for access between three areas: Cahaba Heights, the Colonnade and Patchwork Farms, and Liberty Park. 24-hour turning movement counts were collected at this intersection on February 6, 2019. Analysis completed for this intersection includes a capacity analysis, a signal warrant, sight distance measurements, Curve Analysis Reporting Services (CARS) runs, and crash data analysis. No measurable impact to operations is expected due to school redistricting. The Cahaba Pump Station on the northeast quadrant of the intersection is a historic property, and several utility poles and markers exist in close proximity to the intersection. Figure 3 displays the view from the western leg of the intersection.



Figure 3: Intersection of Sicard Hollow Road and Blue Lake Drive/Cahaba Heights Road

Analysis

While the eight-hour volume warrant was not satisfied, the four-hour volume warrant was satisfied. The signal warrant analysis can be found in Appendix F. Intersections that do not meet the eight-hour volume warrant are typically not considered signal candidates by ALDOT. Though this is not an ALDOT-owned or maintained roadway, there are also stopping sight distance concerns associated with the installation of a signal at this location that increase the likelihood of more severe crashes. Additionally, the installation of a signal generally increases the number of rear end crashes at an intersection. There is no discernible growth trend in nearby historical traffic count data, but Sicard Hollow Road approach volumes would have to grow by at least 5% annually for the eight-hour warrant to be satisfied in five years.

Much of the queuing observed at this intersection was a result of several vehicles platooning behind a slower driver along Sicard Hollow Road. This type of arrival occurred several times during peak hour observations, but the queue processed fairly quickly each time. Considering the safety implications as well as the delay tradeoffs associated with signalization, it is not recommended that a signal be installed at this time. However, this intersection is an excellent candidate for a roundabout based on the need for acceptable levels of service, traffic calming measures, and the mitigation of insufficient intersection sight distance from Sicard Hollow Road. Table 7 shows the existing levels of service for each lane group at the intersection. Table 8 shows levels of service after signalization and the addition of a southbound left turn lane. The numbers shown in parentheses indicate the lane group delay per vehicle in seconds. Table 9 contains the levels of service for a roundabout at the intersection.

Table 7: Existing Lane Group LOS at Sicard Hollow Road and Blue Lake Drive/Cahaba Heights Road (2019)

Approach (Existing Conditions)	AM LOS	PM LOS
	Left/Through/Right	Left/Through/Right
Blue Lake Drive – Northbound	A (0)	A (0)
Cahaba Heights Road – Southbound	A (2.8)	A (3.9)
Driveway – Eastbound	N/A	N/A
Sicard Hollow Road – Westbound	F (>300)*	F (265.6)

*Computed delay in seconds exceeds a meaningful value

Table 8: Lane Group LOS with Signalization (2019)

Approach (Signalized)	AM LOS		PM LOS	
	Left	Through/Right	Left	Through/Right
Blue Lake Drive – Northbound	D (53.7)		B (18.6)	
Cahaba Heights Road – Southbound	B (16.9)	B (10.7)	A (8.9)	A (4.5)
Driveway – Eastbound	N/A		N/A	
Sicard Hollow Road – Westbound	F (117.8)		C (31.6)	

Table 9: Proposed Roundabout LOS at Sicard Hollow Road and Blue Lake Drive/Cahaba Heights Road

Type of Roundabout	Blue Lake Drive – NB		Cahaba Heights Road – SB		Driveway – EB		Sicard Hollow Road – WB		Roundabout LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1-Lane by 1-Lane	B	B	A	A	B	B	E	A	C	B
1-Lane by 2-Lanes	A	B	A	A	A	A	B	A	A	A
2-Lanes by 1-Lane	A	A	A	A	A	A	C	A	B	A
2-Lanes by 2-Lanes	A	A	A	A	A	A	B	A	A	A

Sight distance measurements are documented in Table 10 below. Figures 4 and 5 show the view from the stop line at the Sicard Hollow Road approach.

Table 10: Intersection Sight Distance Summary-Sicard Hollow Road & Blue Lake Drive/Cahaba Heights Road

Approach – View Direction	Measured Intersection Sight Distance (ft)	Required Intersection Sight Distance* (ft)
Sicard Hollow Road – looking northbound	350	390
Sicard Hollow Road – looking southbound	305	390

*According to A Policy on Geometric Design of Highways and Streets (AASHTO 2011) for a 35 MPH facility.

There is limited curve warning signage along Blue Lake Drive and Cahaba Heights Road to encourage lower speeds and caution near the intersection of Sicard Hollow Road. Existing signage is in poor condition. To determine what advisory speeds should be in place for the curves near the intersection, CARS analysis was run on this stretch of roadway. All recommended curve advisory speeds were at or above the speed limit except for the Blue Lake Drive curve immediately south of the Sicard Hollow Road intersection. CARS analysis documentation can be found in Appendix G, and the appropriate signage is noted in the short term recommendations.

Crash data queries returned just two (2) crashes at the intersection itself. Three (3) additional crashes were analyzed, but their actual locations were north of the intersection of Sicard Hollow Road and Blue Lake Drive. Speed was a factor in at least 60% of the crashes, but no other conclusive trends can be established with this sample size.



Figure 4: View from Sicard Hollow Road Looking Northbound along Cahaba Heights Road



Figure 5: View from Sicard Hollow Road Looking Southbound along Blue Lake Drive

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. A Winding Road (W1-5) sign should be installed 100 feet prior to the group of curves along Blue Lake Drive northbound and southbound between Lakeside Drive and the I-459 overpass.
2. Install a combination horizontal alignment/intersection (W1-10e) sign with a Speed Advisory Plaque (W13-1P) at the beginning of the first curve in each direction along Blue Lake Drive/Cahaba Heights Road (northbound and southbound) before the Sicard Hollow Road intersection. In the northbound direction along Blue Lake Drive, the Speed Advisory Plaque (W13-1P) should be 25 MPH. In the southbound direction along Cahaba Heights Road, the Speed

Advisory Plaque (W13-1P) should be 20 MPH. Ideally, solar-powered flashing beacons should be installed on these sign arrangements to improve visibility to drivers.

3. Install two (2) double-sided Chevron (W1-8) signs along the Blue Lake Drive curve immediately south of the intersection.
4. Trim vegetation on the southwestern quadrant of the intersection to improve intersection sight distance for Sicard Hollow Road drivers looking southbound.
5. Install gate-posted Stop Ahead (W3-1) signs approximately 100 feet from the stop line of the Sicard Hollow Road westbound approach.
6. Install lighting at the intersection to improve intersection visibility during nighttime conditions.

Long Term Recommendations:

7. Install a one-lane by one-lane roundabout at the intersection to calm traffic speeds, mitigate sight distance deficiencies, lessen the likelihood of high severity crashes, and improve average delays at the intersection for Sicard Hollow Road approaches. If a roundabout is installed, reevaluate the warning signage in the area prior to installation. Figure 6 shows a concept of the proposed roundabout.

Short term recommendations would not necessarily change the capacity analysis results from existing conditions, but in practice it would ease the execution of movements from the Sicard Hollow Road approach and improve visibility at the intersection and approaching the intersection. The installation of a roundabout is estimated to bring about the levels of service found in Table 9, based on the ALDOT Capacity Analysis for Planning of Roundabouts tool. This analysis tool uses methodology from the *Highway Capacity Manual* (6th Edition). After evaluating the different types of roundabouts and potential design constraints at this location, a one-lane by one-lane roundabout is the recommended configuration. The LOS E at Sicard Hollow Road westbound is a significant improvement over the LOS F registered by the existing intersection (Table 7) and a signalized intersection (Table 8).

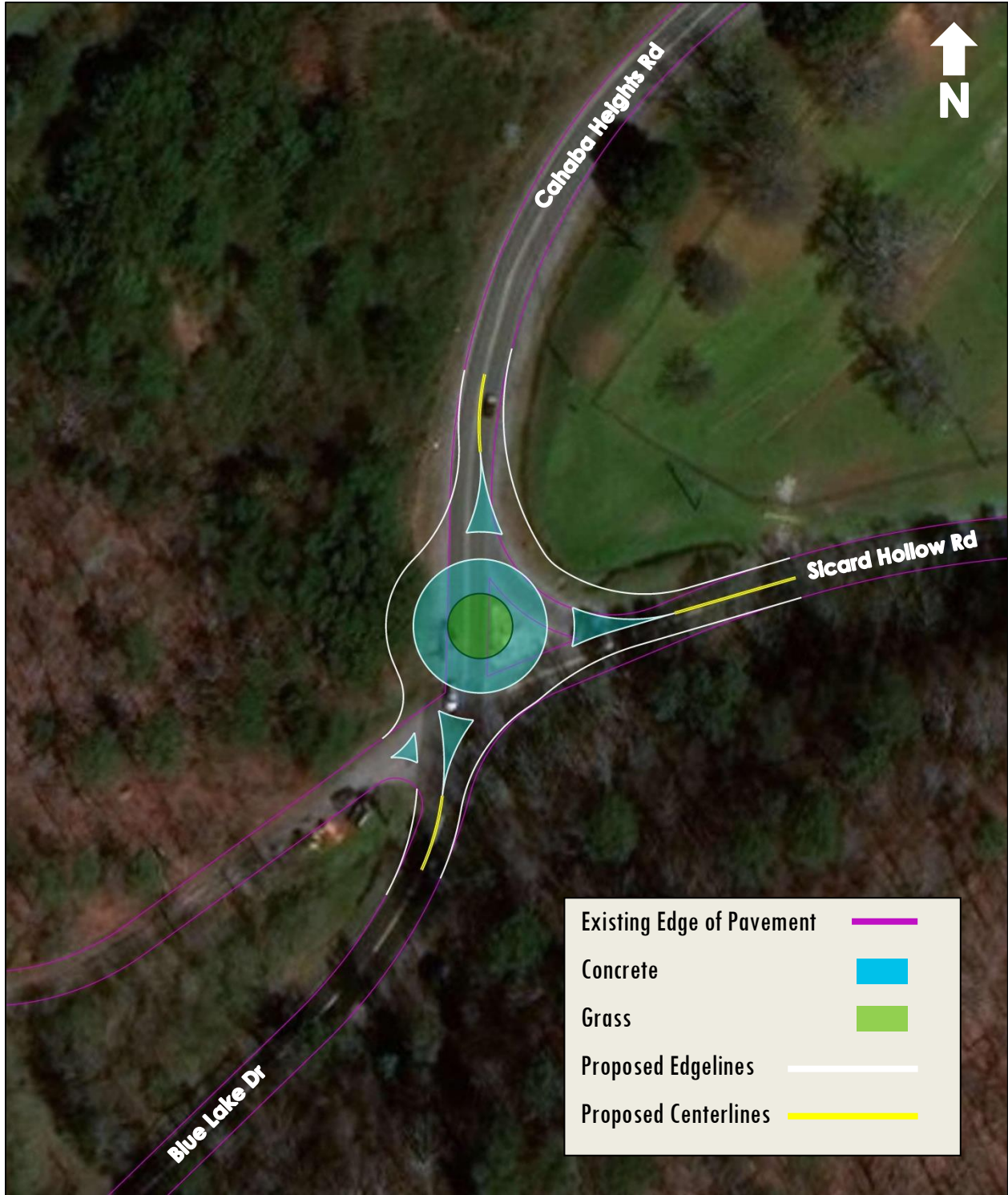


Figure 6: Sicard Hollow Road at Blue Lake Drive Roundabout Concept

2.3 Rocky Ridge Road at Shades Crest Road and US-280

This junction serves to connect many Vestavia Hills neighborhoods to the US-280 corridor. Rocky Ridge Road and Shades Crest Road are both classified as two-lane minor arterials. US-280 is classified as a six-lane principal arterial with a speed limit of 55 MPH. The two signalized intersections are separated by approximately 300 feet. 24-hour turning movement counts were collected on February 6, 2019 at the intersection of Rocky Ridge Road and Shades Crest Road. Peak hour volumes from the US-280 at Rocky Ridge Road intersection were obtained through Skipper Consulting from November 2018.

Analysis performed at these intersections included a capacity analysis and crash data analysis. Figure 7 shows aerial imagery of the two intersections. Several utilities lie in close proximity to the roadway on the east side of Rocky Ridge Road, presenting challenges for any short-term widening of the Rocky Ridge Road northbound approach to US-280.

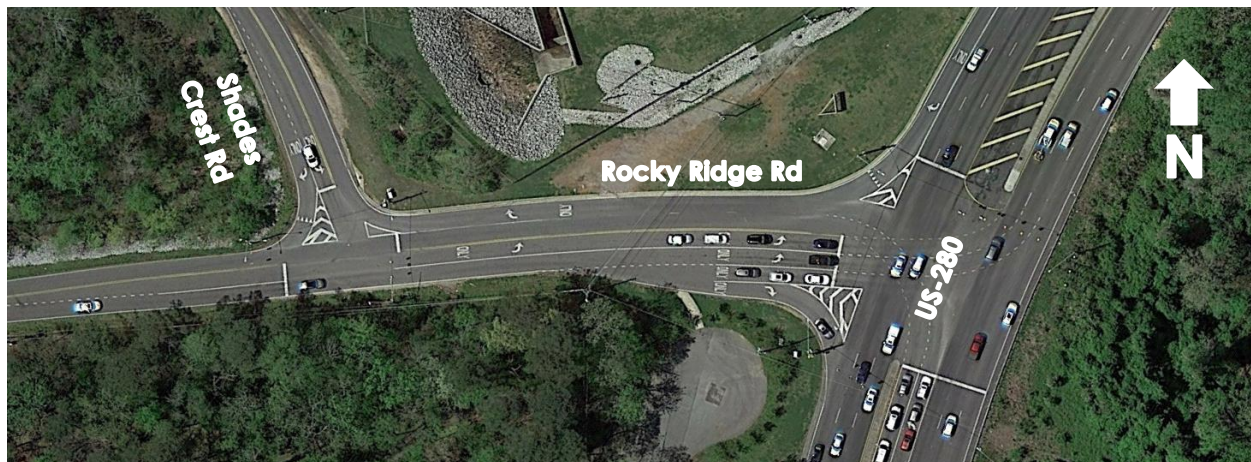


Figure 7: Aerial View of US-280 at Rocky Ridge Road and Shades Crest Road

Analysis

At the height of the AM peak hour, the queue for the Rocky Ridge Road northbound approach to US-280 extended over half of a mile back to Rocky Brook Drive. The Shades Crest Road eastbound phase was served twice per US-280 cycle, which led to drivers receiving a green light when there was no available space to occupy on Rocky Ridge Road northbound. The majority of Shades Crest Road eastbound drivers continue onto Rocky Ridge Road northbound to turn right onto US-280 eastbound.

In the southbound direction during the AM peak hour, Rocky Ridge Road never queued back to US-280. However, the offset between the two intersections caused issues in the PM peak with Rocky Ridge Road southbound queuing back onto US-280. As soon as the westbound left turn phase is serviced on US-280, the southbound phase for Rocky

Ridge Road at Shades Crest Road turned red. Unfortunately, establishing an offset to employ at the Rocky Ridge Road and Shades Crest Road signal is not practical due to cycle lengths on the US-280 adaptive signal system varying throughout the day.

Another issue associated with the short distance between these intersections is that some drivers are unaware that one lane on Rocky Ridge Road southbound continues on Rocky Ridge Road and the other feeds onto Shades Crest Road westbound. This leads to drivers stopping between the two intersections to change lanes and increases the risk of traffic queuing back onto US-280. Existing directional signage along US-280 westbound prior to the left turn lane that illustrates the upcoming scenario is small and outside of the natural eyeline of the average driver. Figure 8 shows the view of the eastbound left turn phase signal heads.



Figure 8: View of US-280 Westbound Left Turn Signal Heads

There is a short concrete path connecting Rocky Ridge Road with the adjacent cul-de-sac on the south side of Rocky Ridge Road. There is a Bike Route sign on Rocky Ridge Road northbound a few feet prior to the path, however it is unclear what purpose the path is currently serving. There are safety concerns regarding the lack of guidance associated with this path, and there are no nearby destinations or existing infrastructure to support bicycles or pedestrians. If vehicles are queued on Rocky Ridge Road northbound, a cyclist or pedestrian exiting the path has no view of oncoming traffic.

Table 11 shows existing levels of service at the US-280 and Rocky Ridge Road intersection for each lane group. The numbers shown in parentheses indicate the lane group delay per vehicle in seconds. Though modeled contiguously in Synchro, the capacity analysis results (see Appendix B) for Shades Crest Road at Rocky Ridge Road were not indicative of the conditions observed in the field due to queue spillback from the US-280 and Rocky Ridge Road intersection.

Table 11: Existing Lane Group LOS at US-280 and Rocky Ridge Road (2019)

Approach	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
Rocky Ridge Road – Northbound	F (111.1)		E (58.7)	F (104.0)		E (67.3)
US-280 – Eastbound		C (34.8)	A (8.2)		F (212.0)	B (9.0)
US-280 – Westbound	F (116.8)	C (31.0)		F (116.4)	A (9.0)	

Despite the satisfactory levels of service registered in the capacity analysis at the intersection of Shades Crest Road and Rocky Ridge Road, queue spillback from the US-280 at Rocky Ridge Road signal prevents the intersection from achieving these levels of service in the field. In other words, the signal at Rocky Ridge Road and Shades Crest Road would operate well if it wasn't in such close proximity to US-280. As a result, our recommendations promote the strategy of maximizing the use of limited space between the intersections to improve the overall efficiency of the system. Currently, the Shades Crest Road phase is set to Max Recall, which takes valuable green time away from Rocky Ridge Road traffic in the PM peak hour and increases the chances of traffic queuing back to US-280 along Rocky Ridge Road southbound.

Thirty nine (39) crashes were reported at the intersection of US-280 and Rocky Ridge Road from 2016 through 2018. The vast majority of crashes from this dataset were low-severity, rear end collisions on the US-280 mainline. Approximately 90% of all crashes involved property damage only. Crash data queries returned zero (0) reported crashes at the intersection of Rocky Ridge Road at Shades Crest Road; however, City staff mentioned two recent crashes involving garbage trucks running straight through the intersection from the steep downgrade of Shades Crest Road's approach to Rocky Ridge Road. Advance warning signage on Shades Crest Road has since been installed to notify heavy vehicle drivers of the steep grade.

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. Place signage on the south signal span wire facing US-280 westbound traffic that delineates the appropriate lane to occupy for each subsequent route once the left turn movement is made onto Rocky Ridge Road southbound. The inside left turn lane feeds Rocky Ridge Road southbound, while the outside left turn lane feeds Shades Crest Road.
2. At the intersection of Shades Crest Road and Rocky Ridge Road, turn off the Max Recall setting for the Shades Crest Road phase.
3. Extend the Rocky Ridge Road northbound right turn lane onto US-280 eastbound back to the Shades Crest Road intersection to give the right turn lane 275 feet of

storage length from the stop line at US-280 with an additional 100 feet of taper length. This would also require the extension of the outermost left turn lane by the same distance as the right turn lane.

4. Remove the path between Rocky Ridge Road and the adjacent cul-de-sac. There are no pedestrian or bicycle facilities nearby, and it is not within driver expectation to encounter either mode at this location.

Long Term Recommendations:

5. Upon turn lane extension, observe the signal performance at the Rocky Ridge Road and Shades Crest Road intersection and make adjustments to signal timings based on the altered traffic conditions.

Table 12 shows the levels of service for the lane groups at the intersection of US-280 and Rocky Ridge Road after taking into account the recommendations found above. Long cycle lengths on US-280 during peak hours lead to poor delay-related metrics, so the goal of the recommendations is to make the most of each phase. Queue spillback will remain an issue for the Rocky Ridge Road at Shades Crest Road intersection as long as it is a full access intersection, but allowing Shades Crest Road drivers to go directly to the right turn lane on Rocky Ridge Road northbound at US-280 will aid the efficiency of both intersections.

Table 12: Lane Group LOS at US-280 and Rocky Ridge Road with All Improvements (2019)

Approach	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
Rocky Ridge Road – Northbound	F (111.1)		B (15.1)	F (104.3)		E (65.8)
US-280 – Eastbound		C (34.8)	A (8.2)		F (211.2)	B (16.8)
US-280 – Westbound	F (116.8)	C (31.0)		F (116.4)	A (8.9)	

Though there is no major difference in the levels of service registered by Synchro due to turn lane lengthening, our peak hour observations at the intersections indicate that increasing turn lane lengths per the recommendations will increase capacity at the intersection by maximizing the number of vehicles that can be stored between US-280 and Shades Crest Road. Several other methods for signal coordination between the two intersections were evaluated, but we do not believe that they guarantee enough of an operational benefit to traffic conditions. Converting the two intersections to run on one signal controller may result in unacceptable inefficiency at the Shades Crest Road and Rocky Ridge Road intersection at all hours of the day. Attempting to hardwire the controller or detection of the US-280 and Rocky Ridge Road signal to the Rocky Ridge Road and Shades Crest Road signal would most likely be effective during peak hours, but also presents a likelihood of unacceptable inefficiency during non-peak hours.

2.4 US-31 at Shades Crest Road

US-31 is classified as a four-lane principal arterial with a speed limit of 40 MPH, and Shades Crest Road is classified as a two-lane minor arterial. Shades Crest Road is one of the major east-west roads in the City of Vestavia Hills, and it intersects US-31 in close proximity to the Vestavia City Center, which is a popular commercial destination. 24-hour turning movement counts from May 2012 were grown using a conservative 0.5% annual growth rate to reach the 2019 existing conditions year. Figure 9 shows a view of the full intersection, and Figure 10 shows the view of the intersection from the Shades Crest Road eastbound approach to US-31. School redistricting will affect this intersection, but no schools are close enough to quantify volume differences with any degree of accuracy. Analysis performed at the intersection included capacity analysis and crash data analysis.

Analysis

Table 13 shows the levels of service for existing conditions. The numbers shown in parentheses indicate the lane group delay per vehicle in seconds. The most pressing issue at this intersection is the interaction between the Shades Crest Road approaches during the side street phase. There is not a sufficient lane configuration for a protected left turn phase on the side streets, and it is difficult to gauge the intentions of opposing drivers due to the skew of the approaches. Figure 11 shows aerial imagery of the intersection.



Figure 9: Looking north at the intersection of US-31 at Shades Crest Road



Figure 10: Looking Eastbound from the Shades Crest Road approach to US-31

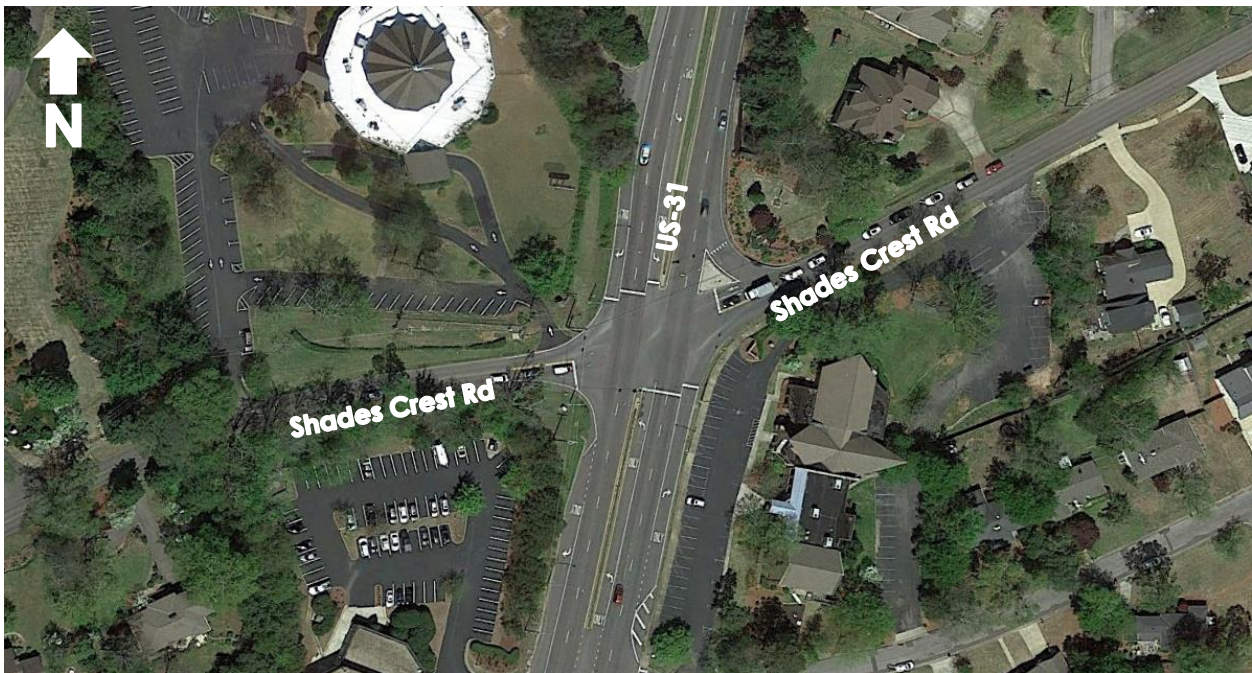


Figure 11: Aerial View of US-31 at Shades Crest Road

During the AM peak hour, the heaviest side street movements are the Shades Crest Road eastbound left turn and the Shades Crest Road westbound right turn. However, there is enough through volume on each Shades Crest Road approach to make it difficult to execute a permissive left turn, which hurts the efficiency of the side street phase. Similar issues are seen during the PM peak hour, but the Shades Crest Road movements are more balanced.

Table 13: Existing Lane Group LOS at US-31 and Shades Crest Road (2019)

Approach	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
US-31 – Northbound	B (10.7)	D (48.6)	B (11.7)	C (27.3)	B (18.6)	A (4.7)
US-31 – Southbound	D (42.4)	B (18.8)	A (3.5)	C (21.8)	C (32.4)	A (5.9)
Shades Crest Road – Eastbound	F (>300)*			F (198.2)		
Shades Crest Road – Westbound	E (72.1)	E (65.3)		F (165.5)	E (64.9)	

*Computed delay in seconds exceeds a meaningful value

Crash data analysis from 2016 through 2018 reveals a high percentage of low-severity crashes. Over half of reported crashes at the intersection were rear end collisions, nearly 20% were angle crashes, and approximately 13% were sideswipe crashes. This data supports the notion that it is difficult to ascertain the intentions of opposing drivers on the Shades Crest Road approaches. The other potential safety concern observed during field observation was the lack of functional sight distance from the US-31 northbound left turn lane. Due to the vertical crest along US-31 just north of the intersection, it is difficult to achieve adequate sight distance to execute a permissive left turn on the US-31 northbound approach, especially when a vehicle is waiting to make the opposing left turn from the US-31 southbound left turn lane.

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. Convert the US-31 northbound left turn phase to protected-only.

Long Term Recommendations:

2. Widen both Shades Crest Road approaches to US-31. Each approach should have a left turn lane and a shared through/right lane. The left turn lanes should have at least 225 feet of storage length to separate the approach's movements early enough for the opposing side street drivers to discern each other's intentions prior to their actual decision point.
3. In conjunction with the widening of the Shades Crest Road approaches to US-31, install flashing yellow arrow (FYA) signal operation on the Shades Crest Road approaches to employ protected-permissive left turn phases. Remove pedestrian push-buttons and pedestrian timings, unless pedestrian facilities are constructed on the west side of the intersection. At that time, perform a signal timing study to determine the appropriate modified timings for the flashing yellow arrow operation.

For the analysis, a parameter was set to utilize the existing amount of the cycle length dedicated to the Shades Crest Road phase during the AM and PM peak hours in order

to fit the recently-retimed US-31 signal system throughout Vestavia Hills. Levels of service along US-31 at the intersection indicate that there is flexibility within the cycle to allocate more time to Shades Crest Road; however, a marginal benefit to the side street may not be an economical use of time when considering how that might affect the US-31 mainline. Given that US-31 within Vestavia Hills was retimed as recently as 2017 with several timing plans in place throughout each day of the week, the practical solution was to accommodate the existing signal coordination on US-31.

Table 14 shows the levels of service for the movements at each intersection after taking into account the recommendations found above. The benefits of the improvements found above come in the form of increased safety and a more functional configuration from the driver's perspective. The high cycle length on US-31 worsens the northbound left turning movement to LOS F, but the sight distance issue is mitigated for a low-volume movement.

Table 14: Lane Group LOS at US-31 and Shades Crest Road with All Improvements (2019)

Approach	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
US-31 – Northbound	F (107.6)	D (48.6)	A (9.0)	F (103.5)	B (17.4)	A (4.6)
US-31 – Southbound	D (44.7)	C (20.2)	A (2.0)	C (20.9)	D (33.7)	A (6.4)
Shades Crest Road – Eastbound	F (>300)*	F (80.1)		F (88.4)	F (109.6)	
Shades Crest Road – Westbound	E (70.5)	F (272.8)		F (213.9)	E (97.4)	

*Computed delay in seconds exceeds a meaningful value

2.5 US-31 at Columbiana Road/I-65 Northbound Ramps

US-31 is classified as a four-lane principal arterial with a speed limit of 40 MPH, and Columbiana Road is classified as a four-lane minor arterial with a speed limit of 40 MPH. Both routes utilize auxiliary turn lanes. The fourth leg (westbound) of the intersection is the I-65 northbound on and off ramps. This signalized intersection is running free with split-phased side streets. 24-hour turning movement counts from May 2012 were grown using a conservative 0.5% annual growth rate to reach the 2019 existing conditions year. Analysis completed at the intersection included a capacity analysis and crash data analysis. It should be noted that extensive capacity issues exist at this intersection and will be documented in any LOS tables, but the focus of the analysis was to provide the City with practical, economical short-term recommendations. Figure 12 shows the view of the US-31 southbound signal heads at the intersection along with the Columbiana Road eastbound right turn approach.

This intersection was included in two past studies performed by Sain Associates. The Statewide Wrong Way Interchange Assessment (2015) identified safety improvements with the focus of preventing wrong way movements at this interchange, which has a

higher potential for wrong way movements due to its partial cloverleaf configuration. The East Central Region Birmingham Area Horizontal Curve Study (2017) evaluated safety improvements for the segment of US-31 (SR-3) between approximate mile points 265.9 and 266.3. US-31's intersection with Columbiana Road and the I-65 Northbound Ramps occurs at approximate mile point 266.3. Documentation of recommendations from both studies can be found in Appendix H.

Analysis

Table 15 shows the existing conditions levels of service for each lane group at the intersection. The numbers shown in parentheses indicate the lane group delay per vehicle in seconds.

Table 15: Existing Lane Group LOS at US-31 and Columbiana Road/I-65 Northbound Ramps (2019)

Approach	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
US-31 – Northbound	C (32.0)	C (31.2)	B (17.5)	D (49.7)	C (27.7)	A (9.8)
US-31 – Southbound	C (20.3)	D (41.2)	A (4.6)	B (17.4)	F (86.2)	A (2.2)
Columbiana Road – Eastbound	F (92.9)	F (84.9)	B (11.2)	F (97.8)	F (87.9)	E (55.9)
I-65 Northbound Ramps – Westbound	E (56.9)	F (135.9)	F (208.6)	E (68.8)	F (134.6)	F (>300)*

*Computed delay in seconds exceeds a meaningful value

The Columbiana Road right turn movement onto US-31 southbound is a dual-right turn lane. The outside right turn lane feeds into a US-31 southbound right turn lane onto the I-65 southbound on ramp. The inside right turn lane feeds into a US-31 southbound through lane. The dual-right turn lanes are currently regulated by the signal. However, observations revealed that familiar drivers tend to treat this as a yield condition when the signal heads are red. Unfamiliar drivers appear to be unsure of what to do when navigating this movement, which frustrates familiar drivers. In addition to that, the inside right turn lane vehicles impair the sight distance of the outside right turn lane drivers and prevents them from safely turning right on red. Some drivers ignore all signage, striping, and signals, and continue through the outside right turn lane without observing US-31 southbound traffic. In summary, the current layout for this dual-right turn lane is not clear enough and functional enough for familiar and unfamiliar drivers.



Figure 12: View of Columbiana Road Right Turn Condition onto US-31 Southbound

Out of 95 reported crashes at this intersection from 2016 through 2018, approximately 79% of all reported crashes involved rear end collisions and approximately 94% of all reported crashes involved property damage only. These numbers are typical of a high-volume, high-capacity signalized intersection such as this. The skewed approach of Columbiana Road presents a higher potential for angle, sideswipe, and head-on collisions, so a focus on lane continuity, signage, and striping was adopted for the recommended safety and operational improvements. The data revealed that these three collision types comprised approximately 21% of all reported crashes in the dataset. At the I-65 northbound off ramp, the horizontal and vertical alignment of the approach causes limited sight distance and a higher potential for rear end collisions on this approach, but the cost of modifying the off ramp would be extremely high given the topography.

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

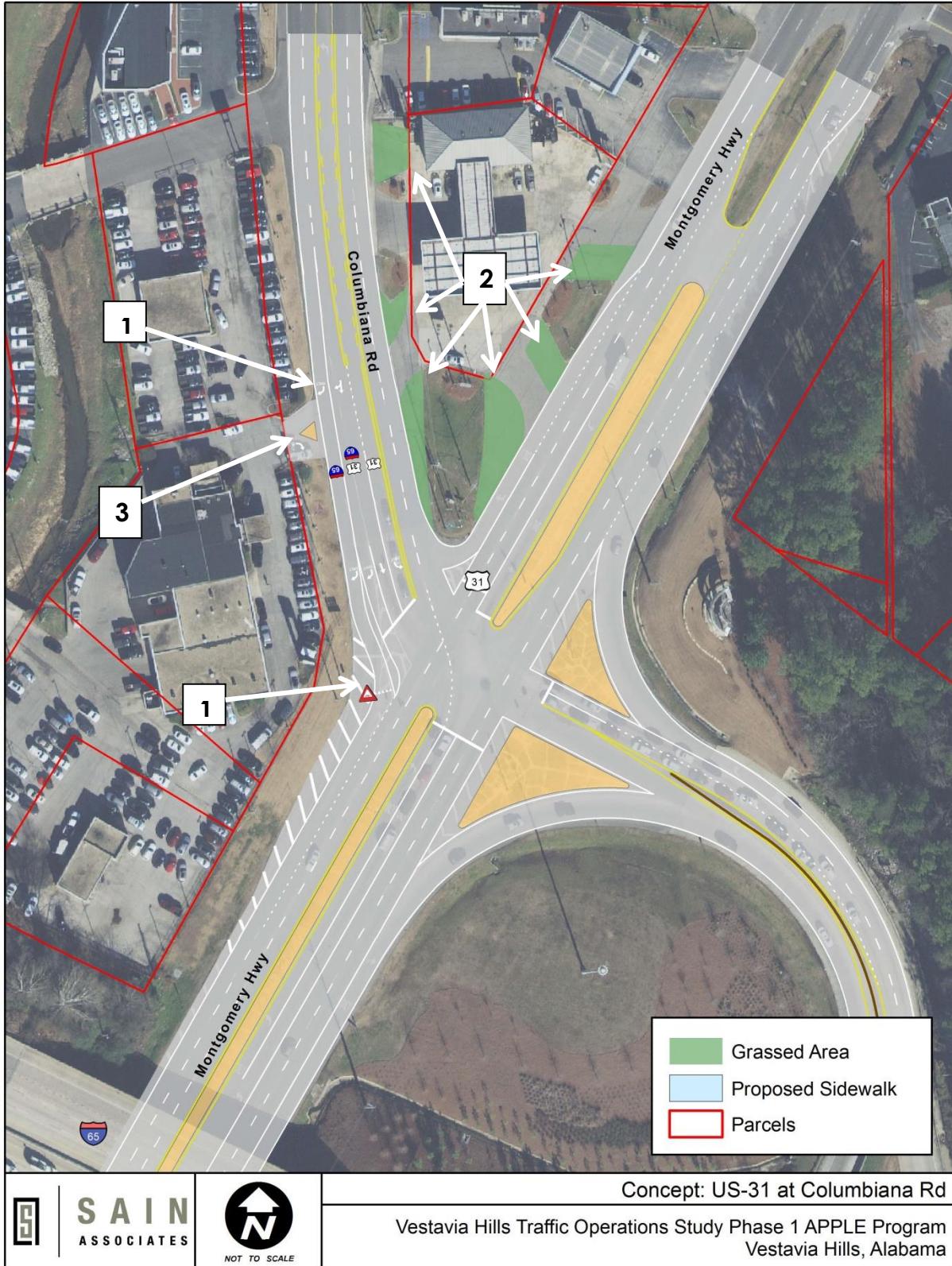
1. Restripe the dual-right turn lane from Columbiana Road to US-31 southbound as shown on Figure 13. Convert the inside lane of Columbiana Road southbound to an option lane, enabling drivers to queue in that lane for either the movement to I-65 northbound or the movement to US-31 southbound. Provide pavement markings in advance to communicate to drivers the appropriate lanes to occupy.

2. Perform access management at the gas station on the northern corner of the intersection. It currently has five (5) driveways, several of which are unnecessarily wide.
3. Convert one (1) access on Columbiana Road to a right-in, right-out configuration.

Long Term Recommendations:

- None

Synchro is not able to adequately process the recommendations listed above in a manner that provides accurate changes to the existing conditions levels of service. However, it is estimated that restriping the right turn lane from Columbiana Road to US-31 southbound may slightly worsen the level of service for that movement, but substantially reduce the issues caused by driver confusion on the movement. Converting the inside lane of Columbiana Road to an option lane should function as an overflow lane for the right turning vehicles onto US-31 southbound. When there isn't a queue in the outside right turn lane, drivers will use the outside right turn lane to the yield condition at US-31. When a queue develops in the outside right turn lane, drivers can opt for the inside right turn lane, which is signalized in accordance with the Columbiana Road signal phase and overlaps with the US-31 northbound left turn phase. The volume distribution between the Columbiana Road left, through, and right turn lanes is so disproportionate towards the right turning movement that any left or through volume caught up in a queue for the right turn lanes would still translate to a more effective overall experience for the most amount of drivers.



Concept: US-31 at Columbiana Rd

Vestavia Hills Traffic Operations Study Phase 1 APPLE Program
Vestavia Hills, Alabama

Figure 13: US-31 at Columbiana Road Concept

2.6 Columbiana Road at Shades Crest Road/Vestaview Lane

Columbiana Road is classified as a four-lane minor arterial with a speed limit of 45 MPH. Shades Crest Road and Vestaview Lane are both classified as two-lane major collectors. Columbiana Road and Shades Crest Road intersect twice, with Shades Crest Road running concurrently with Columbiana Road for approximately 450 feet. Figure 14 shows aerial imagery of the area. The southern, four-leg intersection of Columbiana Road and Shades Crest Road/Vestaview Lane is signalized and running free; the northern, three-leg intersection of Columbiana Road and Shades Crest Road is unsignalized. To fully capture the interaction between the two intersections, both were included in 24-hour turning movement counts collected on February 6, 2019. Shades Mountain Baptist Church is on the southeast corner of the southern intersection of Columbiana Road and Shades Crest Road/Vestaview Lane and has two satellite parking lots. One parking lot is on the southwest quadrant of the intersection, and the other parking lot is on the northeast quadrant of the intersection. School redistricting will place the new Pizitz Middle School along Columbiana Road approximately 1.25 miles south of these intersections. Theoretically, this will increase left turn volumes from Shades Crest Road westbound and Vestaview Lane westbound in the AM peak. Analysis performed at these intersections included a capacity analysis, crash data analysis, signal warrant, and pedestrian access evaluation.



Figure 14: Aerial View of Columbiana Road at Shades Crest Road/Vestaview Lane

Analysis

Existing conditions levels of service for each lane group of these intersections are shown in Tables 16 and 17. The numbers shown in parentheses indicate the lane group delay per vehicle in seconds.

Table 16: Existing Lane Group LOS at Columbiana Road and Shades Crest Road/Vestaview Lane (2019)

Approach	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
Columbiana Road – Northbound	E (55.8)	D (37.7)	A (0)	D (50.4)	C (25.7)	A (0)
Columbiana Road – Southbound	C (31.8)	B (15.4)	A (0)	B (16.9)	C (23.3)	A (0)
Shades Crest Road – Eastbound	E (59.6)			B (27.3)		
Vestaview Lane – Westbound	C (24.8)			C (39.7)		

Table 17: Existing Lane Group LOS at Columbiana Road and Shades Crest Road (2019)

Approach	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
Columbiana Road – Northbound		A (0)	A(0)		A (0)	A (0)
Columbiana Road – Southbound	B (13.2)	A (0)		A (9.3)	A (0)	
Shades Crest Road – Westbound	F (123.5)			F (>300)*		

*Computed delay in seconds exceeds a meaningful value

A signal warrant analysis was performed at the northern intersection of Columbiana Road and Shades Crest Road, and the eight-hour volume warrant was satisfied. Despite the satisfaction of the warrant, it is important to recognize the tradeoffs associated with signaling an intersection in close proximity to an existing signaled intersection. Should the City opt for signalization of the intersection, it is imperative that the two signals be synchronized. This can be done in several ways, including but not limited to time-based coordination via GPS-clock devices, wireless communications equipment, and wired communication by installing a physical cable between the cabinets. The GPS-clock devices would be the most cost-effective measure, but regular maintenance will be required to ensure that the clocks remain consistent with one another. Over time, the GPS-clocks tend to drift out of sync.

Benefits of signaling the northern intersection of Columbiana Road and Shades Crest Road include the following:

- Decreases delays on Shades Crest Road westbound approach to Columbiana Road
- Eliminates sight distance concerns for the Shades Crest Road westbound approach to Columbiana Road.
- Provides better route connectivity for Shades Crest Road

Challenges associated with signaling the northern intersection of Columbiana Road and Shades Crest Road include the following:

- High initial cost to construct a signal

- Regular maintenance associated with ensuring that the two signals remain in sync
- Potential to induce more volume to the Shades Crest Road westbound approach to Columbiana Road
- Cost to upgrade the existing signal to communicate with the new signal

Crash data analysis revealed mostly low-severity crashes with approximately 84% registering as property damage only crashes. The most prevalent types of collisions among reported crashes at these intersections are angle crashes and rear end crashes. Though sight distance from the Shades Crest Road westbound approach is technically adequate, it is still challenging to complete the two-stage left turn from Shades Crest Road onto Columbiana Road southbound. The intersection sight distance requirements found in *A Policy on Geometric Design of Highways and Streets* (2011) are closely met for both directions (looking northbound and southbound) from the Shades Crest Road westbound approach, but it is difficult to ascertain which lane that Columbiana Road southbound vehicles occupy while simultaneously being aware of any vehicles traveling northbound on Columbiana Road. At 45 MPH, 500 feet of intersection sight distance is required. Looking northbound from the Shades Crest Road westbound approach to Columbiana Road, approximately 525 feet of sight distance is available. Looking southbound, approximately 625 feet of sight distance is available.

Another focus of the study of this particular intersection is pedestrian access. Currently, there are pedestrian signal heads on the two southern signal poles with push-button activation as well as a pedestrian phase for the side streets. There is no crosswalk or nearby sidewalk in the vicinity of the intersection. There is a mid-block pedestrian crossing on Vestaview Lane approximately 210 feet from the stop line used to travel between the church and the north satellite lot.

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. Install a crosswalk on the southern side of the Columbiana Road intersection with Shades Crest Road and Vestaview Lane. Install additional sidewalk to connect to the church sidewalk. Install a pedestrian refuge island between Columbiana Road and the frontage road. Figure 15 displays a concept showing each of these improvements.
2. If the City opts for signalization of the northern intersection of Columbiana Road and Shades Crest Road, design and install the signal. Conduct a study to

determine appropriate signal timings, splits, offsets, signage, and striping for the new signal arrangement.

3. Convert the Columbiana Road southbound right turn lane to a smart channel configuration as shown on Figure 15.
4. Install one (1) Stop (R1-1) sign on the frontage road approach to Vestaview Lane just east of Columbiana Road.

Long Term Recommendations:

- None

Tables 18 and 19 show the levels of service for each lane group at the intersections after taking into account the short term recommendations listed above. This table includes the signalization of the northern intersection and the optimization of any cycle lengths, splits, and offsets.

Slightly worsened levels of service on the side streets of the south intersection are a result of the additional green time required for Columbiana Road traffic to achieve good progression in both directions between the two signalized intersections.

Table 18: Lane Group LOS at Columbiana Road and Shades Crest Road/Vestaview Lane with All Improvements (2019)

Approach (Signalized)	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
Columbiana Road – Northbound	E (55.1)	C (28.5)	A (4.7)	D (47.5)	C (23.5)	A (5.2)
Columbiana Road – Southbound	C (31.5)	B (10.5)	A (0.5)	B (10.5)	B (14.0)	A (1.5)
Shades Crest Road – Eastbound	F (97.1)			C (27.3)		
Vestaview Lane – Westbound	C (27.7)			D (44.6)		

Table 19: Lane Group LOS at Columbiana Road and Shades Crest Road with All Improvements (2019)

Approach (Signalized)	AM LOS			PM LOS		
	Left	Thru	Right	Left	Thru	Right
Columbiana Road – Northbound		A (4.2)	A (0.7)		B (10.9)	A (0.9)
Columbiana Road – Southbound	A (5.0)	A (3.0)		B (11.7)	B (14.8)	
Shades Crest Road – Westbound	D (37.1)			C (35.0)		

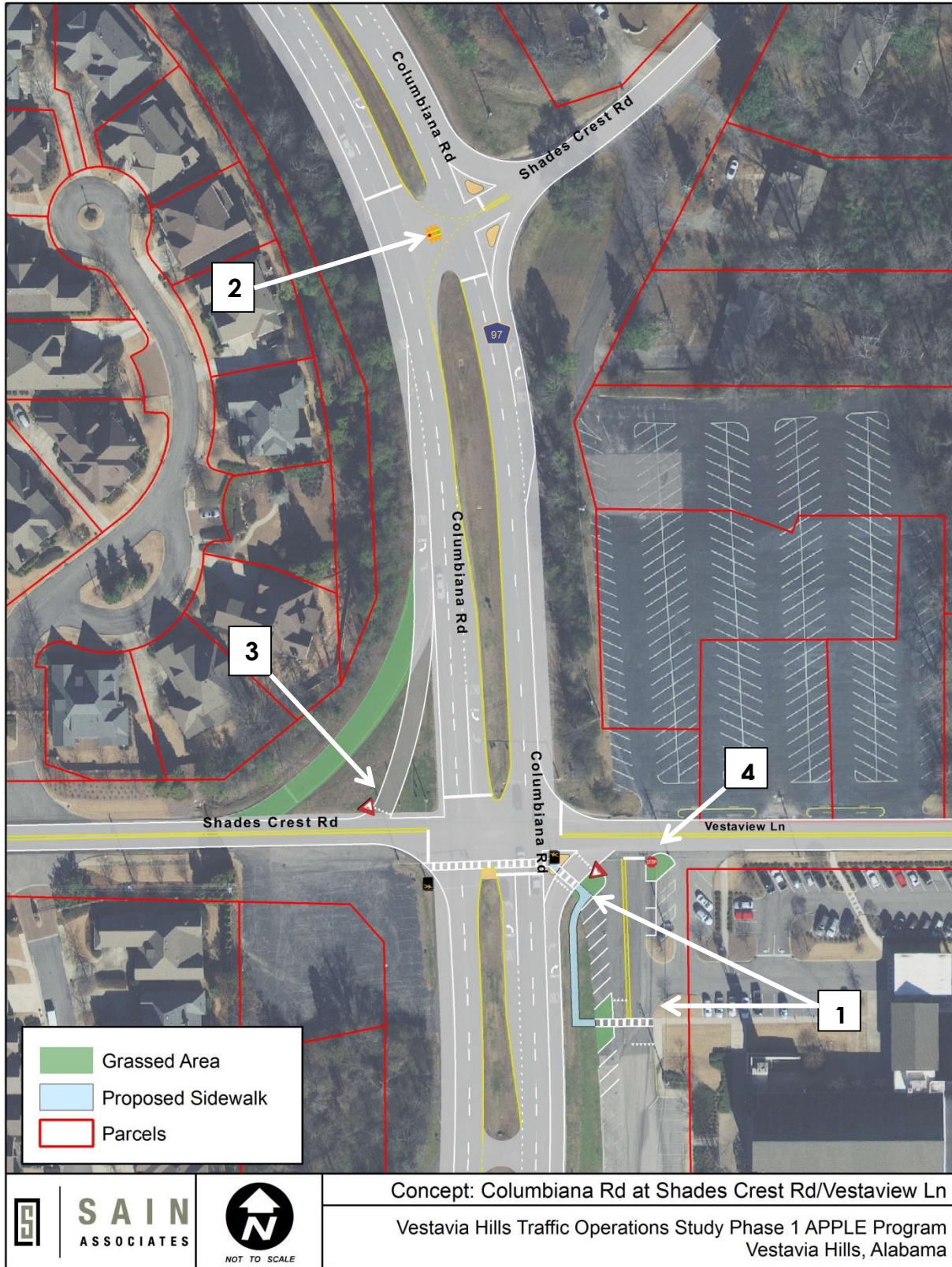


Figure 15: Columbiana Road at Shades Crest Road/Vestaview Lane Concept

2.7 US-31 at Vestavia Plaza/City Hall

US-31 is classified as a four-lane principal arterial with a speed limit of 40 MPH, and both accesses to US-31 are classified as local roads. This intersection is signalized and coordinated with a number of other signals along US-31 through Vestavia Hills. The primary focus of analysis on this particular intersection is to increase pedestrian access in the area. Nearby pedestrian trip generators and destinations include residential neighborhoods on both sides of US-31, shopping centers on the both sides of US-31, the Vestavia Hills City Hall on the west side of US-31, and the new community center schedule to open in 2020. Existing sidepaths are located along the west side of US-31 from Massey Road to Vestavia Court and the east side of US-31 from Pizitz Drive to Vesthaven Way. Vesthaven Way is approximately 400 feet south of this intersection. There is also existing sidewalk within the shopping centers on both sides of US-31 at this location. Figure 16 shows the view of the intersection from the west side of US-31 at Vestavia Plaza.



Figure 16: US-31 at Vestavia Plaza/City Hall

Analysis

Table 20 shows the current timings in place at the intersection. The phases most critical to pedestrian access would be the side street phases, which are Phases 4 and 8. During several time-of-day plans currently in service, the side street phase has a maximum split of 20 or 25 seconds. If pedestrian timings were implemented, these would need to be increased due to the intersection width of approximately 105 feet from back-of-curb to back-of-curb on the southern leg of the intersection. The minimum amount of time needed would be 4 seconds of 'Walk' time with an additional 28.5 seconds of 'Flashing – Don't Walk' time according to the *ALDOT Traffic Signal Design Guide and Timing Manual* (2015). For phases 2 and 6, the US-31 mainline cycle lengths allow plenty of

time for pedestrian pedestrians to safely cross the side streets via crosswalk. The first column in Table 20 denotes each timing plan in place along the US-31 corridor throughout Vestavia. Each plan is identified within the controller by a combination of numbers, which represent the dial identifier, split identifier, and offset identifier, respectively. The time of day that each plan is active is included in parentheses beside the Dial/Split/Offset identifiers.

Table 20: Existing Signal Timing Plans and Splits at US-31 and Vestavia Plaza

Dial / Split / Offset	Cycle	1	2	3	4	5	6	7	8	Offset
0/0/4 (Free)	-	-	-	-	-	-	-	-	-	-
1/1/1 (Off-peak)	110	20	70	0	20	20	70	0	20	11
2/1/1 (Mid-day)	160	20	115	0	25	20	115	0	25	88
2/3/1 (School Peak)	140	20	100	0	20	20	100	0	20	13
3/1/1 (AM Peak)	200	20	160	0	20	20	160	0	20	112
4/1/1 (PM Peak)	200	20	145	0	35	20	145	0	35	85

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. Install a high-visibility crosswalk on the southern leg of the US-31 intersection at Vestavia Plaza and City Hall. Restripe the stop line and lane lines of US-31 northbound accordingly. Install pedestrian signal heads with countdown display. Figure 17 displays a concept showing each of these improvements.
2. Install additional sidewalk to connect to the existing sidewalks on both sides of US-31.

Long Term Recommendations:

- None

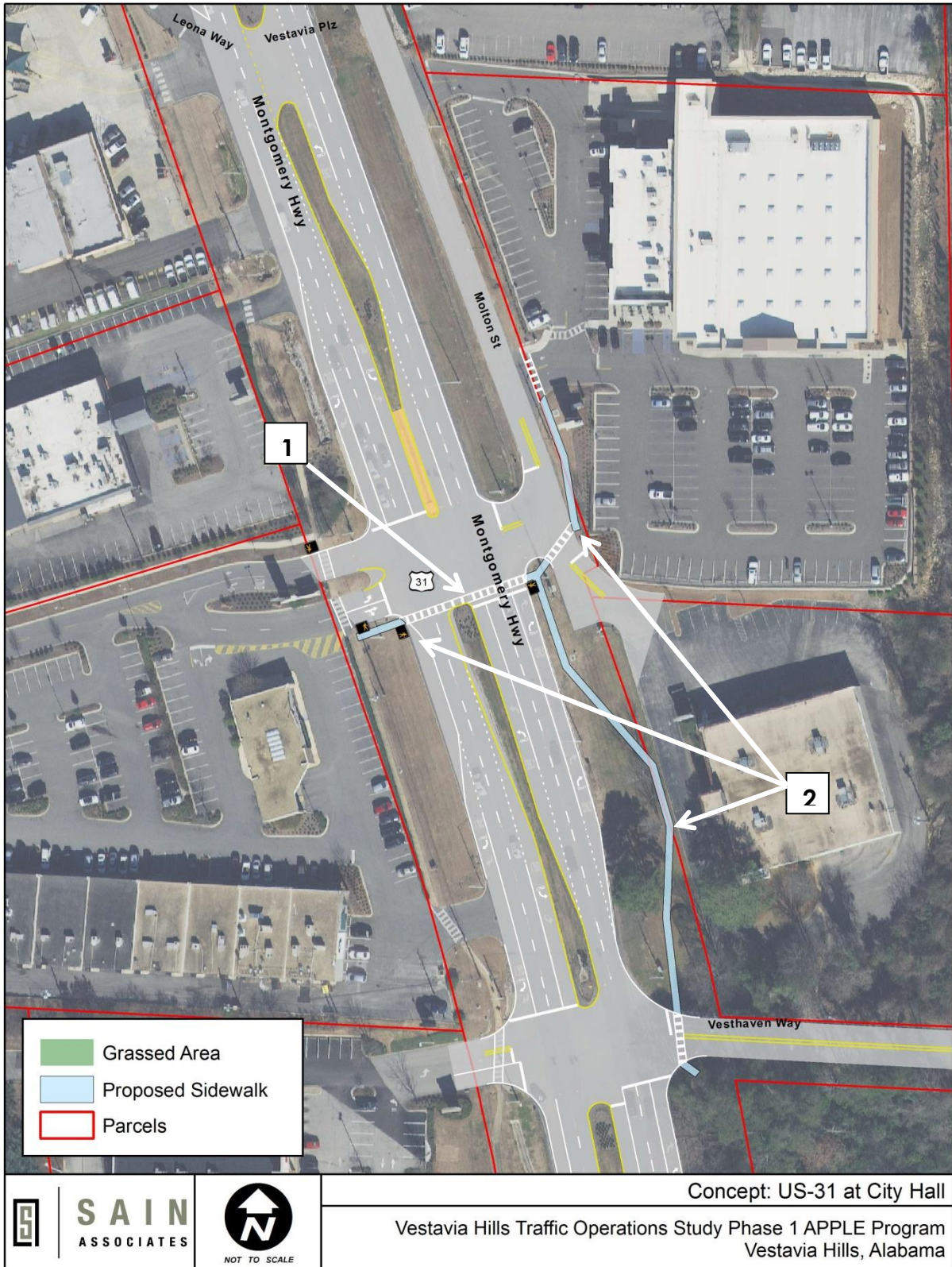


Figure 17: US-31 at Vestavia Plaza/City Hall Concept

2.8 US-31 at Pizitz Drive/Vestavia Forest Place

US-31 is classified as a four-lane principal arterial with a speed limit of 40 MPH, and both Pizitz Drive and Vestavia Forest Place are classified as local roads. This intersection is signalized and coordinated with a number of other signals along US-31 through Vestavia Hills. The primary focus of analysis on this particular intersection is to increase pedestrian access in the area. Nearby pedestrian trip generators and destinations include residential neighborhoods, high-density residential apartments, commercial establishments, and the existing Pizitz Middle School, which will house the 9th grade beginning in the 2020-2021 school year. It should be noted that the enrollment at Pizitz with 9th grade only is estimated to be less than half of the current middle school enrollment at the same facility (see Table 1). Existing sidepaths are located along the west side of US-31 from Massey Road to Vestavia Court and the east side of US-31 from Pizitz Drive to Vesthaven Way. Figure 18 shows the view of the intersection from the east side of US-31.



Figure 18: US-31 and Pizitz Drive/Vestavia Forest Place

Analysis

Table 21 shows the current timings in place at the intersection. The phases most critical to pedestrian access would be the side street phases, which are Phases 4 and 8. During one timing plan currently in service, the side street phase has a maximum split of 20 seconds. If pedestrian timings were implemented, the maximum split for that phase would need to be increased due to the intersection width of approximately 90 feet from the west edgeline to the east channelizing island on the northern leg of the intersection. The minimum amount of time needed would be 4 seconds of 'Walk' time with an additional 24 seconds of 'Flashing – Don't Walk' time according to the ALDOT Traffic Signal Design Guide and Timing Manual (2015). The first column in Table 21

denotes each timing plan in place along the US-31 corridor throughout Vestavia. Each plan is identified within the controller by a combination of numbers, which represent the dial identifier, split identifier, and offset identifier, respectively. The time of day that each plan is active is included in parentheses beside the Dial/Split/Offset identifiers.

Table 21: Existing Signal Timing Plans and Splits at US-31 and Pizitz Drive/Vestavia Forest Place

Dial / Split / Offset	Cycle	1	2	3	4	5	6	7	8	Offset
0/0/4 (Free)	-	-	-	-	-	-	-	-	-	-
1/1/1 (Off-peak)	110	20	70	0	20	20	70	0	20	13
2/1/1 (Mid-day)	160	20	110	0	30	20	110	0	30	11
2/3/1 (School Peak)	140	20	80	0	40	35	65	0	40	84
3/1/1 (AM Peak)	200	20	135	0	45	35	120	0	45	34
4/1/1 (PM Peak)	200	20	145	0	35	20	145	0	35	190

Additionally, the existing striping of the Pizitz Drive approach to US-31 is confusing given the skew of the approach. The current striping causes the US-31 southbound left turning vehicles to traverse the outbound left turn lane of Pizitz Drive. The skew also causes conflicts between drivers crossing US-31 from Pizitz Drive and Vestavia Forest Place. The striping of the Pizitz Drive approach does not offer adequate lane continuity, making it difficult to discern where other drivers will go from either approach. Figure 19 displays aerial imagery of the intersection.

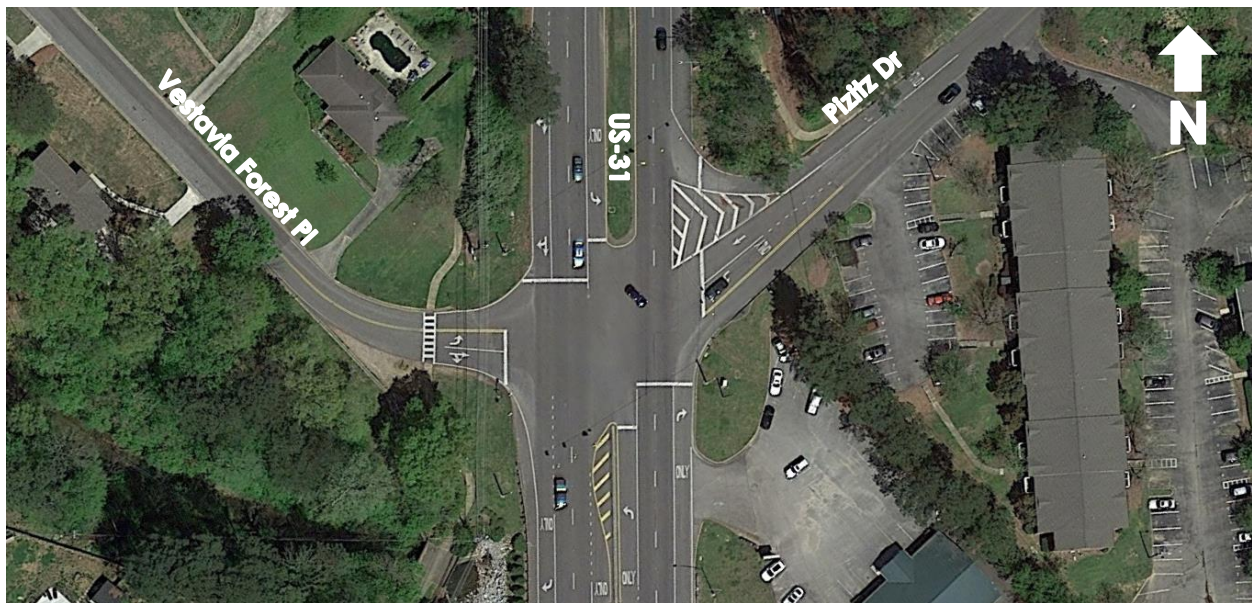


Figure 19: Aerial View of US-31 and Pizitz Drive/Vestavia Forest Place

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. Install a crosswalk on the northern leg of the US-31 intersection at Pizitz Drive and Vestavia Forest Place. Restripe the stop line and lane lines of US-31 southbound accordingly. Additionally, install additional sidewalk to connect to the existing sidewalks on both sides of US-31. Install pedestrian signal heads with countdown display. Figure 20 displays a concept showing each of these improvements.
2. Restripe the Pizitz Drive approach as shown in Figure 20. Install a raised concrete island to channelize the right turn lane from Pizitz Drive to US-31 northbound and give pedestrians a refuge island.
3. Install a Yield Here to Pedestrians (R1-5) sign at the crosswalk located in the channelized right turn lane from Pizitz Drive westbound to US-31 northbound.

Long Term Recommendations:

- None

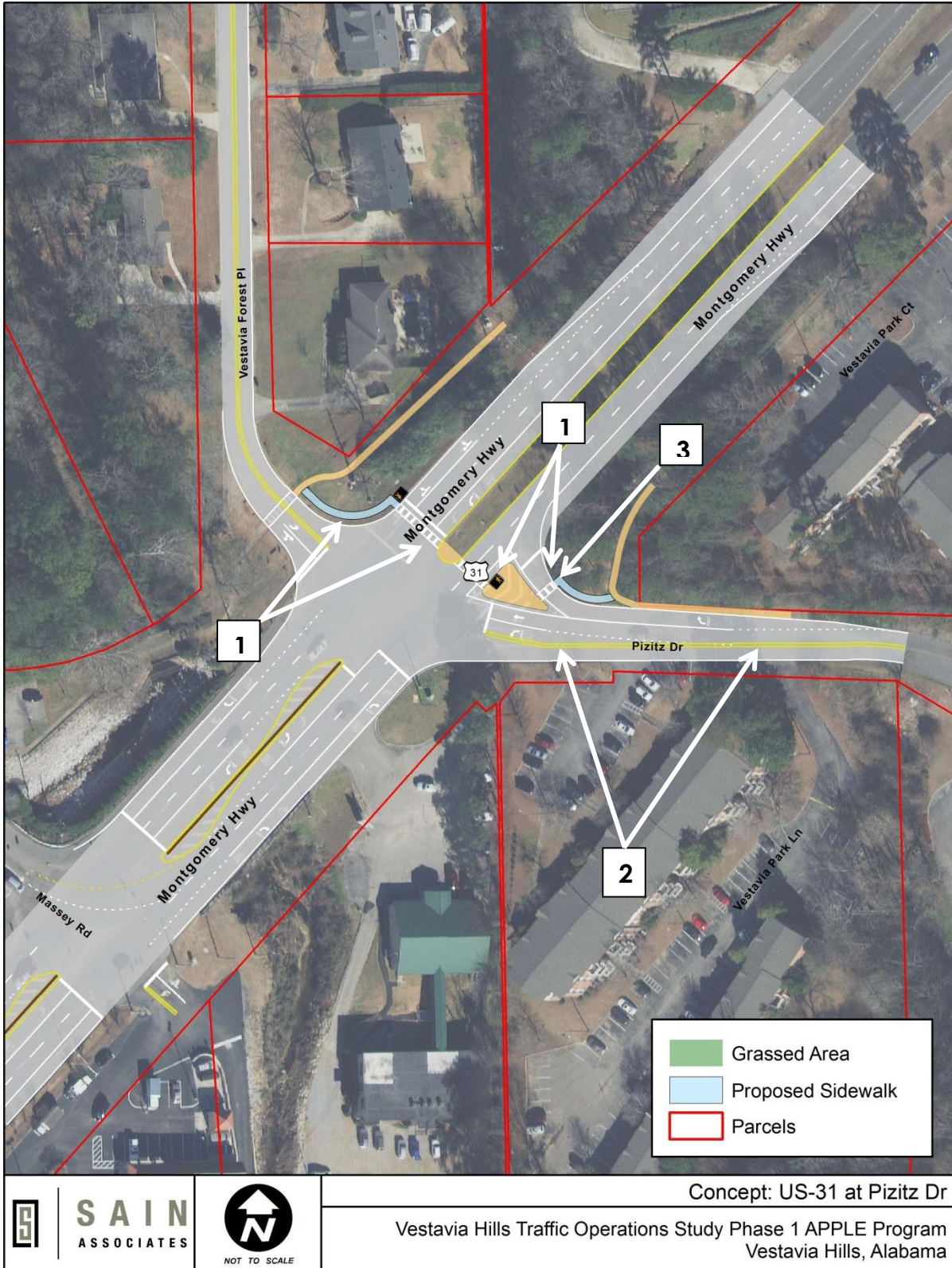


Figure 20: US-31 at Pizitz Drive/Vestavia Forest Place Concept

2.9 Dolly Ridge Road at Gresham Drive

Dolly Ridge Road is classified as a two-lane major collector with a speed limit of 35 MPH, while Gresham Drive is classified as a local road with a speed limit of 25 MPH. The intersection is currently signalized and running free at all times. Dolly Ridge Road is a low-volume roadway connecting Rocky Ridge Road and Cahaba River Road. Analysis performed at this intersection included a capacity analysis, crash data analysis, and trip generation for the estimated enrollment for the 2019-2020 school year.

The intersection of Dolly Ridge Road and Gresham Drive will be heavily affected by school redistricting. For the 2018-2019 school year, Jefferson County still occupies the school while Vestavia Hills renovates the school in preparation for its use in the 2019-2020 school year and beyond. Table 1 denotes that the estimated enrollment at the new elementary school will be 735 students. With a sizeable shift in trip mode choice from bus to personal vehicle that will be associated with changing the school from a Jefferson County school to Vestavia Hills city school, the demands on nearby signalized intersections and roadways will change significantly.

Trip generation was performed for the new Dolly Ridge Elementary School based on traffic volumes from Cahaba Heights Elementary School performed during the 2013-2014 school year. Cahaba Heights Elementary is also a Vestavia Hills city school and serves as a baseline for calculating potential trips per student enrolled at the new elementary school. Additional information regarding the methodology used in this trip generation can be found in Appendix D.

The intersection currently has a left turn lane along Dolly Ridge Road eastbound and a channelized right turn lane from Gresham Drive to Dolly Ridge Road westbound. Figure 21 shows aerial imagery of the intersection.



Figure 21: Aerial View of Dolly Ridge Road at Gresham Drive

The existing operational conditions for the AM and School PM peak hours were rendered mostly irrelevant due to the major changes brought about by school redistricting. Therefore, the existing volumes collected on February 6, 2019 were modified with trip generation volumes and analyzed after optimizing the signal timings to accommodate the new scenario. Largely unaffected by everyday school traffic, the afternoon commuter peak hour existing volumes were used in analysis for the PM peak hour. Table 22 displays the level of service for each lane group at the intersection after taking into account trip generation volumes. The numbers in parentheses indicate the average delay per vehicle in seconds.

Table 22: Existing Lane Group LOS with Trip Generation at Dolly Ridge Road and Gresham Drive (2019)

Approach	AM LOS		School PM LOS		PM* LOS	
	Left	Through/Right	Left	Through/Right	Left	Through/Right
Gresham Drive – Southbound	D (46.4)	A (8.7)	C (21.3)	A (8.2)	B (13.3)	A (8.3)
Dolly Ridge Road – Eastbound	F (170.3)	A (6.0)	A (7.0)	A (5.8)	A (0)	A (2.6)
Dolly Ridge Road – Westbound		C (27.4)		C (22.1)		A (2.7)

*School trip generation estimates do not affect PM LOS, only AM and School PM LOS.

Table 23 shows the net added trips brought about by the trip generation. At its core, trip generation is a data-based approximation of future conditions for the surrounding area. The numbers shown below should be treated accordingly, especially for a scenario as unique as this one.

Table 23: Net Added Volume by Trip Generation

Approach	Net AM Trips			Net School PM Trips		
	Left	Thru	Right	Left	Thru	Right
Gresham Drive – Southbound	166	N/A	318	55	N/A	306
Dolly Ridge Road – Eastbound	576	0	N/A	237	0	N/A
Dolly Ridge Road – Westbound	N/A	0	16	N/A	0	115

Though the peak hour factors used in the capacity analysis account for the fact that most school-related traffic will attempt to access the school in a small window of time, the levels of service shown in Tables 22 and 24 do not entirely capture the nature of a school peak hour. The arrival rate in the carpool queue will be higher than the departure rate, and queues will increase quickly at that time. However, the levels of service from the capacity analysis do reflect the fact that traffic on Dolly Ridge Road is light enough that a protected-permissive left turn phase on Dolly Ridge Road should be able to handle much of the stress put on the intersection during these short peaks. For this reason, the school should develop a detailed circulation plan for pickup and dropoff to ensure that process is as safe and efficient as it can be. If carpool queues reach Dolly Ridge Road, it will not matter how efficiently the signal performs.

The crash data analysis at this intersection included three (3) crashes from 2016 through 2018. The sample size is too small to derive any major conclusions, but speed or distracted driving was a factor in each of the reported crashes. The combination of the horizontal curves and the significant grade changes in the vicinity of this intersection cause sight distance issues, but this type of topography is typical of Dolly Ridge Road and well within driver expectation for drivers who are familiar with the road.

Recommendations

Considering existing safety and operational performance of the intersection, the following short-term and long-term recommendations should be implemented.

Short Term Recommendations:

1. Extend the left turn lane at the Dolly Ridge Road eastbound approach as far back as feasible. Due to existing pavement width and time constraints, this leg of the intersection could be restriped with lane widths of 10 feet to extend the left turn lane to allow a storage length of approximately 325 feet, a taper length of 100 feet, and a transition taper length of 205 feet (see Figure 22).
2. Widen Gresham Drive southbound to two lanes (one left turn lane, one right turn lane) to the school exit driveway or as far back as feasible.
3. Implement the base signal timings included in Appendix E. Periodically check that all detection continues to function. Monitor the intersection once school begins and make any necessary tweaks.

4. Upon any widening of Gresham Drive, resurface the roadway from Dolly Ridge Road to the northernmost school access point.
5. Develop a circulation plan for school pickup and dropoff to minimize impact to the signal performance of Dolly Ridge Road at Gresham Drive.
6. Install one (1) Signal Ahead Warning (W3-3) sign approximately 325 feet from the stop line along Dolly Ridge Road eastbound.
7. Install one (1) 20 MPH School Zone Speed Limit Assembly in each direction along Dolly Ridge Road approximately 1000 feet prior to the intersection with Gresham Drive. The assembly consists of one (1) 20 MPH Speed Limit (R2-1) sign, one (1) School (S4-3P) plaque, and one time of day plaque (S4-1P). See Figure 7B-1 in the *Manual on Uniform Traffic Control Devices (2009)* for other options on the assembly. Install one (1) End School Zone (S5-2) sign in each direction along Dolly Ridge Road approximately 1000 feet after the intersection with Gresham Drive.
8. Trim any vegetation blocking Dolly Ridge Road eastbound drivers' view of the signal heads at the intersection of Gresham Drive. Trim vegetation blocking the Gresham Drive southbound signal heads.

Long Term Recommendations:

- None

Table 24 shows the levels of service for the movements at the intersection after taking into account the recommendations. This table includes the optimization of any cycle lengths and splits. Synchro does not register a level of service improvement after lengthening existing turn lanes; however, it is clear that the existing turn lanes are insufficient for the volume expected at the intersection during school peak hours. Lengthening the Dolly Ridge Road eastbound left turn lane will lessen the impact on Dolly Ridge Road through traffic, while widening to two lanes on Gresham Drive southbound for any amount of length will allow school traffic to exit more efficiently.

Table 24: Lane Group LOS at Dolly Ridge Road and Gresham Drive with Improvements (2019)

Approach	AM LOS		School PM LOS		PM* LOS	
	Left	Through/ Right	Left	Through/ Right	Left	Through/ Right
Gresham Drive – Southbound	F (88.6)	B (10.8)	B (16.9)	A (6.1)	B (11.0)	A (6.7)
Dolly Ridge Road – Eastbound	F (91.8)	A (4.9)	A (9.3)	A (7.9)	A (0)	A (3.5)
Dolly Ridge Road – Westbound		D (43.9)		C (20.5)		A (3.6)

*School trip generation estimates do not affect PM LOS, only AM and School PM LOS.



Figure 22: Concept for Restriping Dolly Ridge Road just south of Gresham Drive

3 Cost Estimates

Planning level cost estimates were prepared for the improvement recommendations for each studied intersection. These detailed opinions of cost are included in Appendix I. Each estimate is based on the engineer's experiences and qualifications and represents the engineer's best judgment within the industry. The engineer does not guarantee that proposals, bids, or actual costs will not vary from the engineer's opinion of probable cost. Table 25 provides a summary of costs estimated in 2019 dollars for the improvement recommendations. For budgeting future year projects, the City will need to escalate the costs to future year dollars.

A contingency of 25% was included in each estimate. This contingency cost includes miscellaneous and/or unknown items that cannot be quantified at the time the study was conducted. The improvements identified at some of the intersections will require utility relocation and/or right-of-way acquisition; the 25% contingency does not cover utility or right-of-way costs which should be considered when programming any future projects.

Some of the improvement recommendations can be implemented solely with City funds. In instances where the proposed improvements are more extensive or costly, it is likely that federal or state funding would be required. For these cases, ALDOT indirect costs were included in the cost estimate and were estimated at 13.63% of the total project costs.

Table 25: Summary of Opinion of Probable Costs in Year 2019 Dollars

Intersection	Opinion of Cost (Yr. 2019)	
	Short Term	Long Term
Rocky Ridge Road @ Dolly Ridge Road	\$100,000	\$1.21M
Sicard Hollow Road @ Blue Lake Drive	\$320,000	\$2.02M
Rocky Ridge Road @ Shades Crest Road and US-280	\$1M	
US-31 @ Shades Crest Road	\$50,000	\$1.13M
US-31 @ Columbiana Road/I-65 Northbound Ramps	\$370,000	
Columbiana Road @ Shades Crest Road/Vestaview Lane	\$770,000	
US-31 @ Vestavia Plaza/City Hall	\$260,000	
US-31 @ Pizitz Drive	\$230,000	
Dolly Ridge Road @ Gresham Drive	\$750,000	

4 Funding Sources

The City has the option to fund the design and construction of their preferred improvements using only local funds. Choosing this route allows the project design and construction to have shorter timelines and the potential for reduced project costs since fewer plan reviews would be required and City guidelines will govern the project design. Improvements that only affect city or county roadways will be able to operate on a quicker timeline, but any improvements located on state routes must go through additional approvals, permitting, and use ALDOT standards.

Costs associated with the design and construction of the proposed alternatives could exceed the City's current available resources. This section discusses funding sources that are available to aid in design and construction. Federal programs are administered by the Alabama Department of Transportation. Table 26 details funding sources, the category of the source and type of project for which the funding can be used.

Table 26: Funding Options

Funding Source	Category	Match Type
Surface Transportation Plan (STP)	Federal	80% Federal / 20% City
Highway Safety Improvement Plan (HSIP)	Federal	90% Federal / 10% City
Transportation Alternatives Program (TAP)	Federal	80% Federal / 20% City
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Federal	80% Federal / 20% City

The Surface Transportation Program (STP), administered by ALDOT, requires an 80 Federal/20% Local match. The STP program provides flexible funding to states and localities for their use in preserving and improving the conditions and performance of a roadway. STP eligible activities applicable to the alternatives studied include: operational improvements for highways and intersections with high levels of congestion. The downside to STP funding is the time it adds to the overall project. Additional time is required in order to account for ALDOT and FHWA involvement including additional plan reviews and more stringent design and construction standards. For these reasons, a timeframe for completing a STP funded project is estimated at five to eight years.

<https://www.fhwa.dot.gov/specialfunding/stp/160307.cfm>

The Highway Safety Improvement Program (HSIP) is a 90% Federal/10% Local match program and has been continued through the Fixing America's Surface Transportation Act (FAST Act). HSIP exists to provide funding to perform projects that seek to reduce the number of fatalities and serious injuries resulting from traffic crashes. HSIP funds are administered by ALDOT's Safety Operations Office. The application for HSIP funds

requests, among other general project details, that the project sponsor show how the proposed project will improve safety using Crash Reduction Factors (CRF). A benefit/cost ratio is also a requirement of the application. The application must be signed by a Professional Engineer. Like STP funding, HSIP funded projects require additional time in order to account for ALDOT and FHWA involvement including additional plan reviews and more stringent design and construction standards. For these reasons, a timeframe for completing a HSIP funded project is estimated at five to eight years.

<https://safety.fhwa.dot.gov/hsip/>

The Transportation Alternatives Program (TAP) is an 80% Federal/20% Local match program continued through the Fixing America's Surface Transportation (FAST) Act. TAP funding is available for projects defined as transportation alternatives. Example of transportation alternatives include the following scenarios: on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhance mobility, community improvement activities such as historic preservation and vegetation management, environmental mitigation related to stormwater and habitat connectivity, recreational trail projects, safe routes to school projects, and projects for planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former divided highways.

https://www.fhwa.dot.gov/environment/transportation_alternatives/

The Congestion Mitigation and Air Quality Improvement Program (CMAQ) is a 80% Federal/20% Local match program and has been continued through the Fixing America's Surface Transportation Act (FAST Act). CMAQ funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for various pollutants. Any project must be included in the metropolitan planning organization's (MPO) current transportation plan and transportation improvement plan (TIP).

<https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm>

5 Next Steps

The purpose of this study was to determine the feasibility of potential improvements to several intersections throughout the City of Vestavia Hills. The City may elect to pursue projects described in this study without federal funding. However, an Alabama Department of Transportation (ALDOT) permit for the improvements would have to be obtained for any work that would occur inside ALDOT right-of-way. If the City chooses to move forward with implementing any of the proposed improvements and would like to pursue Federal funding, the next step would be to request inclusion of a project in the Birmingham Regional Transportation Improvement Plan (TIP). Once funds are in

place for the project, an environmental document will need to be prepared. The environmental document must include technical studies and public involvement outreach necessary to comply with procedures of NEPA. Once the environmental study has been completed, design would be finalized followed by construction. If it is determined that additional right-of-way is required, acquisition would be conducted prior to construction.

Appendix A – Raw Traffic Counts

Vestavia Hills, AL
Classified Turn Movement Count

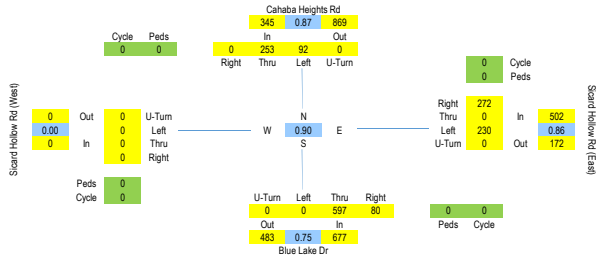
Site 1 of 5
Scard Hollow Rd (West)
Scard Hollow Rd (East)
Blue Lake Dr
Cahaba Heights Rd

Lat/Long
33.450874, -86.717796

Date
Wednesday 6 February 2019

Weather
Showers
Temp: 21°C

0000 - 2400 (Weekday 24h Session)



TIME	Eastbound Scard Hollow Rd (West)				Westbound Scard Hollow Rd (East)				Northbound Blue Lake Dr				Southbound Cahaba Heights Rd				Int Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	1.14	1.15	1.16		
0000-0015	0	0	0	0	0	2	0	0	0	0	2	1	0	3	0	0	8	22
0015-0030	0	0	0	0	0	2	0	0	0	0	2	2	0	0	2	0	8	18
0030-0045	0	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	5	10
0045-0100	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	7
0100-0115	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	4	7
0115-0130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
0130-0145	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	2	6
0145-0200	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4
0200-0215	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	4
0215-0230	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	2
0230-0245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
0245-0300	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	5
0300-0315	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
0315-0330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
0330-0345	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	4	11
0345-0400	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	3	12
0400-0415	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
0415-0430	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2	0	4	43
0430-0445	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3	0	5	63
0445-0500	0	0	0	0	0	9	0	0	0	0	0	0	0	0	5	0	14	86
0500-0515	0	0	0	0	0	8	0	1	0	0	2	0	0	1	8	0	20	109
0515-0530	0	0	0	0	0	5	0	4	0	0	4	2	0	0	9	0	24	148
0530-0545	0	0	0	0	0	8	0	7	0	0	5	2	0	1	5	0	28	208
0545-0600	0	0	0	0	0	4	0	8	0	0	5	6	0	2	12	0	37	302
0600-0615	0	0	0	0	0	8	0	16	0	0	14	10	0	1	10	0	59	423
0615-0630	0	0	0	0	0	10	0	15	0	0	19	11	0	7	22	0	84	596
0630-0645	0	0	0	0	0	24	0	18	0	0	37	20	0	4	19	0	122	898
0645-0700	0	0	0	0	0	23	0	31	0	0	43	26	0	11	24	0	168	1198
0700-0715	0	0	0	0	0	21	0	46	0	0	94	33	0	12	26	0	232	1414
0715-0730	0	0	0	0	0	32	0	60	0	0	195	31	0	26	42	0	386	1524
0730-0745	0	0	0	0	0	53	0	83	0	0	169	23	0	32	63	0	423	1407
0745-0800	0	0	0	0	0	65	0	63	0	0	135	11	0	22	77	0	373	1175
0800-0815	0	0	0	0	0	80	0	86	0	0	98	15	0	12	71	0	342	985
0815-0830	0	0	0	0	0	46	0	34	0	0	105	20	0	7	57	0	269	1788
0830-0845	0	0	0	0	0	38	0	24	0	0	61	17	0	6	45	0	191	661
0845-0900	0	0	0	0	0	37	0	26	0	0	66	10	0	6	38	0	183	631
0900-0915	0	0	0	0	0	20	0	18	0	0	40	16	0	9	42	0	145	605
0915-0930	0	1	0	0	0	30	0	17	0	0	34	10	0	3	46	1	142	580
0930-0945	0	0	0	0	0	27	0	26	0	0	43	19	0	5	41	0	161	590
0945-1000	0	0	0	0	0	23	0	17	0	0	46	18	0	6	47	0	157	543
1000-1015	0	0	0	0	0	17	0	11	0	0	43	12	0	14	32	0	129	537
1015-1030	0	0	0	0	0	6	0	20	0	0	57	13	0	9	28	0	133	552
1030-1045	0	0	0	0	0	15	0	19	0	0	50	13	0	3	24	0	124	607
1045-1100	0	0	0	0	0	15	0	14	0	0	56	13	0	13	40	0	151	650
1100-1115	0	0	0	0	0	23	0	16	0	0	60	12	0	5	28	0	144	680
1115-1130	0	0	0	0	0	18	0	11	0	0	87	14	0	13	55	0	188	737
1130-1145	0	0	0	0	0	14	0	12	0	0	64	18	0	10	49	0	167	721
1145-1200	0	0	0	0	0	14	0	9	0	0	79	18	0	14	47	0	181	754
1200-1215	0	0	0	0	0	18	0	15	0	0	77	24	0	13	54	0	201	756
1215-1230	0	0	0	0	0	11	0	13	0	0	69	13	0	13	63	0	182	735
1230-1245	0	0	0	0	0	21	0	17	0	0	53	30	0	21	48	0	190	712
1245-1300	0	1	0	0	0	7	0	13	0	0	87	22	0	10	52	1	183	705
1300-1315	0	0	0	0	0	16	0	22	0	0	65	17	0	13	46	0	160	692
1315-1330	0	0	0	0	0	1	0	8	0	0	46	22	0	9	55	0	159	693
1330-1345	0	0	0	0	0	22	0	17	0	0	55	26	1	15	47	0	183	706
1345-1400	0	0	0	0	0	17	0	12	0	0	57	23	0	21	40	0	170	683
1400-1415	0	0	0	0	0	15	0	14	0	0	54	22	0	29	47	0	181	728
1415-1430	0	0	0	0	0	14	0	19	0	0	49	30	0	18	42	0	172	783
1430-1445	0	0	0	0	0	16	0	17	0	0	44	16	0	25	52	0	170	653
1445-1500	0	0	0	0	0	17	0	13	0	0	55	30	0	34	56	0	205	938
1500-1515	0	0	0	0	0	24	0	21	0	0	59	28	0	48	56	0	236	990
1515-1530	0	0	0	1	0	33	0	50	0	0	59	29	0	20	50	0	242	1104
1530-1545	0	0	0	0	0	30	0	28	0	0	75	38	0	27	57	0	255	1200
1545-1600	0	0	0	0	0	28	0	22	0	0	90	42	0	31	44	0	257	1278
1600-1615	0	0	0	0	0	21	0	15	0	0	119	83	0	40	72	0	350	1336
1615-1630	0	0	0	0	0	15	0	34	0	0	111	72	0	47	59	0	338	1370
1630-1645	0	0	0	1	0	23	0	21	0	0	119	62	0	35	72	0	333	1394
1645-1700	0	0	0	0	0	23	0	10	0	0	106	51	0	48	99	0	337	1382
1700-1715	0	0	0	0	0	15	0	29	0	0	112	83	0	58	75	0	372	1319
1715-1730	0	0	0	0	0	29	0	19	0	0	127	60	0	43	74	0	352	1228
1730-1745	0	0	0	0	0	28	0	27	0	0	112	39	0	50	74	0	331	1122
1745-1800	0	0	0	0	0	19	0	15	0	0	85	40	0	31	74	0	284	972
1800-1815	0	0	0	0	0	30	1	19	0	0	88	35	0	38	70	0	281	866
1815-1830	0	0	0	0	0	20	0	22	0	0	66	43	0	36	59	0	246	728
1830-1845	0	0	0	0	0	16	0	12	0	0	53	25	0	26	49	0	181	633
1845-1900	0	0	0	0	0	16	0	15	0	0	41	18	0	20	48	0	158	576
1900-1915	0	0	0	0	0	14	0	12	0	0	46	14	0	26	31	0	143	552
1915-1930	0	0	0	0	0	16	0	25	0	0	38	23	1	20	28	0	151	538
1930-1945	0	0	0	0	0	8	0	7	0	0	37	23	0	23	26	0	124	513
1945-2000	0	0	0	0	0	13	0	19	0	0	31	22	0	31	18	0	134	476
2000-2015	0	0	0	0	0	10	0	8	0	0	37	26	0	15	33	0	129	410
2015-2030	0	0	0	0	0	18	0	10	0	0	29	29	0	15	25	0	126	336
2030-2045	0	0	0	0	0	8	0	2	0	0	23	20	0	19	15	0	87	279
2045-2100	0	0	0	0	0	6	0	4	0	0	25	10	0	11	12	0	68	243
2100-2115	0	0	0	0	0	4	0											

Peak Rolling Hour Flow Rates

TIME	Eastbound				Westbound				Northbound				Southbound				Int Total
	Sicard Hollow Rd (West)				Sicard Hollow Rd (East)				Blue Lake Dr				Cahaba Heights Rd				
	U-Turn 1.1	Left 1.2	Thru 1.3	Right 1.4	U-Turn 1.5	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	Left 1.14	Thru 1.15	Right 1.16	
0715 - 0730	0	0	0	0	0	32	0	60	0	0	195	31	0	26	42	0	386
0730 - 0745	0	0	0	0	0	53	0	83	0	0	169	23	0	32	63	0	423
0745 - 0800	0	0	0	0	0	65	0	63	0	0	135	11	0	22	77	0	373
0800 - 0815	0	0	0	0	0	80	0	66	0	0	98	15	0	12	71	0	342
Grand Total	0	0	0	0	0	230	0	272	0	0	597	80	0	92	253	0	1524
Approach (%)	0.00	0.00	0.00	0.00	0.00	45.82	0.00	54.18	0.00	0.00	88.18	11.82	0.00	26.67	73.33	0.00	
Total (%)	0.00	0.00	0.00	0.00	0.00	15.09	0.00	17.85	0.00	0.00	39.17	5.25	0.00	6.04	16.60	0.00	
PHF	0%				86%				75%				87%				90%
P/Cycle	0%	0%	0%	0%	0%	72%	0%	82%	0%	0%	77%	65%	0%	72%	82%	0%	
Cars	0	0	0	0	0	226	0	272	0	0	588	77	0	92	250	0	1505
Single Unit Trucks	0	0	0	0	0	3	0	0	0	0	9	2	0	0	3	0	17
Combination Trucks	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2
P/Cycle (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cars (%)	0.00	0.00	0.00	0.00	0.00	98.26	0.00	100.00	0.00	0.00	98.49	96.25	0.00	100.00	98.81	0.00	98.75
Single Unit Trucks (%)	0.00	0.00	0.00	0.00	0.00	1.30	0.00	0.00	0.00	0.00	1.51	2.50	0.00	0.00	1.19	0.00	1.12
Combination Trucks (%)	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	0.13

Vestavia Hills, AL
Classified Turn Movement Count

Site 2 of 5
CH-97 Shades Crest Rd

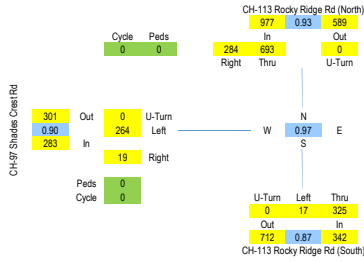
CH-113 Rocky Ridge Rd (South)
CH-113 Rocky Ridge Rd (North)

Lat/Long
33.461623°, -86.757834°

Date
Wednesday 6 February 2019

Weather
Showers
Temp: 21°C

0000 - 2400 (Weekday 24h Session)



TIME	Eastbound CH-97 Shades Crest Rd		
	U-Turn 2.1	Left 2.2	Right 2.3
0000 - 0015	0	2	0
0015 - 0030	0	1	0
0030 - 0045	0	0	0
0045 - 0100	0	0	0
0100 - 0115	0	0	0
0115 - 0130	0	1	0
0130 - 0145	0	1	0
0145 - 0200	0	0	0
0200 - 0215	0	0	0
0215 - 0230	0	0	0
0230 - 0245	0	0	0
0245 - 0300	0	0	0
0300 - 0315	0	0	0
0315 - 0330	0	1	0
0330 - 0345	0	0	0
0345 - 0400	0	1	0
0400 - 0415	0	0	0
0415 - 0430	0	0	0
0430 - 0445	0	4	0
0445 - 0500	0	4	0
0500 - 0515	0	0	0
0515 - 0530	0	4	0
0530 - 0545	0	4	0
0545 - 0600	0	4	0
0600 - 0615	0	4	1
0615 - 0630	0	12	1
0630 - 0645	0	11	1
0645 - 0700	0	14	0
0700 - 0715	0	17	3
0715 - 0730	0	30	4
0730 - 0745	0	33	6
0745 - 0800	0	27	5
0800 - 0815	0	61	7
0815 - 0830	0	32	1
0830 - 0845	0	37	2
0845 - 0900	0	29	1
0900 - 0915	0	37	2
0915 - 0930	0	34	0
0930 - 0945	0	44	0
0945 - 1000	0	34	3
1000 - 1015	0	35	2
1015 - 1030	0	47	5
1030 - 1045	0	32	2
1045 - 1100	0	33	4
1100 - 1115	0	44	3
1115 - 1130	0	50	4
1130 - 1145	0	52	3
1145 - 1200	0	52	6
1200 - 1215	0	33	4
1215 - 1230	0	49	3
1230 - 1245	0	52	1
1245 - 1300	0	58	3
1300 - 1315	0	50	2
1315 - 1330	0	36	5
1330 - 1345	0	49	4
1345 - 1400	0	49	3
1400 - 1415	0	44	4
1415 - 1430	0	59	6
1430 - 1445	0	43	1
1445 - 1500	0	57	6
1500 - 1515	0	53	0
1515 - 1530	0	49	4
1530 - 1545	0	63	7
1545 - 1600	0	59	2
1600 - 1615	0	51	6
1615 - 1630	0	49	3
1630 - 1645	0	75	4
1645 - 1700	0	53	7
1700 - 1715	0	67	6
1715 - 1730	0	69	2
1730 - 1745	0	63	7
1745 - 1800	0	53	4
1800 - 1815	0	62	3
1815 - 1830	0	49	2
1830 - 1845	0	44	2
1845 - 1900	0	32	1
1900 - 1915	0	42	5
1915 - 1930	0	31	1
1930 - 1945	0	19	1
1945 - 2000	0	19	0
2000 - 2015	0	34	0
2015 - 2030	0	36	3
2030 - 2045	0	26	3
2045 - 2100	0	31	0
2100 - 2115	0	17	0
2115 - 2130	0	14	1
2130 - 2145	0	8	1
2145 - 2200	0	26	0
2200 - 2215	0	4	0
2215 - 2230	0	3	1
2230 - 2245	0	3	1
2245 - 2300	0	1	1
2300 - 2315	0	5	1
2315 - 2330	0	1	1
2330 - 2345	0	4	0
2345 - 0000	0	1	0
Grand Total	0	2616	191
Approach (%)	0.00	93.20	6.80
Total (%)	0.00	16.69	1.22
P/Cycle	0	0	0
Cars	0	2576	185
Single Unit Trucks	0	35	6
Combination Trucks	0	5	0
P/Cycle (%)	0.00	0.00	0.00
Cars (%)	0.00	96.47	96.86
Single Unit Trucks (%)	0.00	1.34	3.14
Combination Trucks (%)	0.00	0.19	0.00

TIME	Northbound CH-113 Rocky Ridge Rd (South)			Southbound CH-113 Rocky Ridge Rd (North)			Int Total	Rolling Hour
	U-Turn 2.4	Left 2.5	Thru 2.6	U-Turn 2.7	Thru 2.8	Right 2.9		
0000 - 0015	0	0	1	0	6	1	10	28
0015 - 0030	0	0	2	0	2	1	6	24
0030 - 0045	0	0	2	0	0	6	10	23
0045 - 0100	0	0	1	0	1	0	2	19
0100 - 0115	0	0	2	0	4	0	6	19
0115 - 0130	0	1	1	0	1	1	5	14
0130 - 0145	0	0	3	0	2	0	6	14
0145 - 0200	0	0	1	0	1	0	2	10
0200 - 0215	0	0	0	0	0	0	1	10
0215 - 0230	0	0	1	0	2	2	5	11
0230 - 0245	0	0	1	0	1	0	2	8
0245 - 0300	0	0	1	0	1	0	2	7
0300 - 0315	0	0	0	0	1	1	2	8
0315 - 0330	0	0	1	0	0	0	2	10
0330 - 0345	0	0	0	0	1	0	1	16
0345 - 0400	0	0	0	0	1	1	3	31
0400 - 0415	0	0	1	0	1	2	4	42
0415 - 0430	0	0	7	0	0	1	8	48
0430 - 0445	0	1	10	0	0	1	16	61
0445 - 0500	0	0	6	0	0	4	14	82
0500 - 0515	0	0	8	0	1	1	10	126
0515 - 0530	0	1	12	0	1	3	21	172
0530 - 0545	0	1	17	0	5	10	37	241
0545 - 0600	0	1	31	0	5	17	58	347
0600 - 0615	0	0	37	0	5	9	56	485
0615 - 0630	0	0	44	0	12	21	90	666
0630 - 0645	0	1	80	0	22	28	143	837
0645 - 0700	0	0	104	0	35	43	198	966
0700 - 0715	0	2	131	0	40	46	239	1039
0715 - 0730	0	4	128	0	61	32	259	1101
0730 - 0745	0	1	104	0	85	43	272	1091
0745 - 0800	0	0	111	0	82	44	269	1089
0800 - 0815	0	2	113	0	86	52	301	1085
0815 - 0830	0	3	126	0	51	36	249	956
0830 - 0845	0	1	125	0	56	49	270	971
0845 - 0900	0	3	106	1	74	51	265	926
0900 - 0915	0	2	81	0	47	42	211	890
0915 - 0930	0	2	92	0	61	36	225	893
0930 - 0945	0	4	77	0	49	51	225	871
0945 - 1000	0	3	96	0	51	42	229	853
1000 - 1015	0	3	74	0	55	45	214	816
1015 - 1030	0	4	59	0	53	36	203	808
1030 - 1045	0	1	74	0	56	42	207	873
1045 - 1100	0	2	58	0	64	31	192	900
1100 - 1115	0	4	69	0	53	33	206	981
1115 - 1130	0	1	99	0	74	40	258	1006
1130 - 1145	0	2	71	0	69	37	234	989
1145 - 1200	0	6	74	0	84	51	273	1010
1200 - 1215	0	4	65	0	83	42	231	992
1215 - 1230	0	4	61	0	90	44	251	1024
1230 - 1245	0	10	71	0	72	48	255	1020
1245 - 1300	0	6	78	0	70	40	255	1006
1300 - 1315	0	5	76	0	80	47	263	1001
1315 - 1330	0	2	84	0	77	43	247	1008
1330 - 1345	0	2	58	0	83	43	240	1030
1345 - 1400	0	9	65	0	82	43	251	1025
1400 - 1415	0	2	95	0	84	41	270	1059
1415 - 1430	0	3	58	0	91	52	269	1022
1430 - 1445	0	3	63	1	81	44	235	1036
1445 - 1500	0	5	64	0	112	41	285	1166
1500 - 1515	0	0	62	0	86	32	233	1209
1515 - 1530	0	1	79	0	101	48	282	1326
1530 - 1545	0	2	90	0	150	54	366	1413
1545 - 1600	0	6	105	0	114	42	328	1462
1600 - 1615	0	1	114	0	143	35	350	1520
1615 - 1630	0	1	78	1	178	59	369	1582
1630 - 1645	0	1	71	0	195	69	415	1602
1645 - 1700	0	6	92	0	153	75	386	1578
1700 - 1715	0	5	82	0	184	68	412	1590
1715 - 1730	0	5	80	0	161	72	389	1515
1730 - 1745	0	5	75	0	181	63	391	1430
1745 - 1800	0	4	78	0	190	69	398	1522
1800 - 1815	0	4	75	0	148	45	337	1050
1815 - 1830	0	3	89	0	114	47	304	900
1830 - 1845	0	0	48	0	82	37	213	769
1845 - 1900	0	2	37	0	79	45	196	694
1900 - 1915	0	3	36	1	74	28	187	623
1915 - 1930	0	2	39	0	68	32	173	572
1930 - 1945	0	0	30	0	66	22	138	571
1945 - 2000	0	0	30	1	57	18	125	564
2000 - 2015	0	1	18	0	70	13	136	557
2015 - 2030	0	2	39	0	62	30	172	521
2030 - 2045	0	1	36	0	51	14	131	441
2045 - 2100	0	0	29	0	37	21	118	375
2100 - 2115	0	2	26	0	39	16	100	336
2115 - 2130	0	1	16	0	41	19	92	276
2130 - 2145	0	1	14	0	32	9	65	220
2145 - 2200	0	1	21	0	22	9	79	184
2200 - 2215	0	0	10	0	24	2	40	136
2215 - 2230	0	1	7	0	18	6	38	126
2230 - 2245	0	1	9	0	12	3	29	104
2245 - 2300	0	0	10	0	15	4	31	94
2300 - 2315	0	1	6	0	13	4	30	75
2315 - 2330	0	0	4	0	6	2	14	
2330 - 2345	0	0	3	0	11	1	19	
2345 - 0000	0	1	6	0	3	1	12	
Grand Total	0	175	4724	4	5338	2629	15677	
Approach (%)	0.00	3.57	96.43	0.05	66.97	32.98		
Total (%)	0.00	1.12	30.13	0.03	34.05	16.77		
P/Cycle	0	0	0					

Peak Rolling Hour Flow Rates

TIME	Eastbound CH-97 Shades Crest Rd		
	U-Turn 2.1	Left 2.2	Right 2.3
1630 - 1645	0	75	4
1645 - 1700	0	53	7
1700 - 1715	0	67	6
1715 - 1730	0	69	2
Grand Total	0	264	19
Approach (%)	0.00	93.29	6.71
Total (%)	0.00	16.48	1.19
PHF	90%		
	0%	88%	68%
P/Cycle	0	0	0
Cars	0	262	18
Single Unit Trucks	0	1	1
Combination Trucks	0	1	0
P/Cycle (%)	0.00	0.00	0.00
Cars (%)	0.00	99.24	94.74
Single Unit Trucks (%)	0.00	0.38	5.26
Combination Trucks (%)	0.00	0.38	0.00

TIME	Northbound CH-113 Rocky Ridge Rd (South)			Southbound CH-113 Rocky Ridge Rd (North)			
	U-Turn 2.4	Left 2.5	Thru 2.6	U-Turn 2.7	Thru 2.8	Right 2.9	Int Total
1630 - 1645	0	1	71	0	195	69	415
1645 - 1700	0	6	92	0	153	75	386
1700 - 1715	0	5	82	0	184	68	412
1715 - 1730	0	5	80	0	161	72	389
Grand Total	0	17	325	0	693	284	1602
Approach (%)	0.00	4.97	95.03	0.00	70.93	29.07	
Total (%)	0.00	1.06	20.29	0.00	43.26	17.73	
PHF	87%			93%			97%
	0%	71%	88%	0%	89%	95%	
P/Cycle	0	0	0	0	0	0	0
Cars	0	16	325	0	689	280	1590
Single Unit Trucks	0	1	0	0	4	3	10
Combination Trucks	0	0	0	0	0	1	2
P/Cycle (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cars (%)	0.00	94.12	100.00	0.00	99.42	98.59	99.25
Single Unit Trucks (%)	0.00	5.88	0.00	0.00	0.58	1.06	0.62
Combination Trucks (%)	0.00	0.00	0.00	0.00	0.00	0.35	0.12

Peak Rolling Hour Flow Rates

TIME	Eastbound				Westbound				Northbound				Southbound				Int
	CH-97 Shades Crest Rd				Vestaview Ln				Columbiana Rd				CH-97 Columbiana Rd				
	U-Turn 3.1	Left 3.2	Thru 3.3	Right 3.4	U-Turn 3.5	Left 3.6	Thru 3.7	Right 3.8	U-Turn 3.9	Left 3.10	Thru 3.11	Right 3.12	U-Turn 3.13	Left 3.14	Thru 3.15	Right 3.16	
1700 - 1715	0	13	16	4	0	26	44	35	1	11	148	26	0	46	195	79	644
1715 - 1730	0	21	21	4	0	30	37	19	0	5	111	29	1	41	235	80	634
1730 - 1745	0	14	29	4	0	27	47	26	0	7	96	33	1	49	242	67	642
1745 - 1800	0	17	22	1	0	30	38	28	0	5	105	27	0	63	222	69	627
Grand Total	0	65	88	13	0	113	166	108	1	28	460	115	2	199	894	295	2547
Approach (%)	0.00	39.16	53.01	7.83	0.00	29.20	42.89	27.91	0.17	4.64	76.16	19.04	0.14	14.32	64.32	21.22	
Total (%)	0.00	2.55	3.46	0.51	0.00	4.44	6.52	4.24	0.04	1.10	18.06	4.52	0.08	7.81	35.10	11.58	
PHF	88%				92%				81%				97%				99%
P/Cycle	0%	77%	76%	81%	0%	94%	88%	77%	25%	64%	78%	87%	50%	79%	92%	92%	
Cars	0	65	88	13	0	113	166	108	1	28	460	115	2	199	894	294	2546
Single Unit Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Combination Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P/Cycle (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cars (%)	0.00	100.00	100.00	100.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.66	99.96
Single Unit Trucks (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.04
Combination Trucks (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vestavia Hills, AL
Classified Turn Movement Count

Site 4 of 5

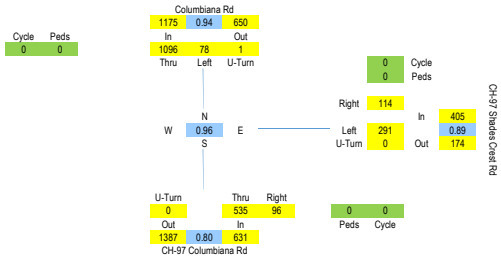
CH-97 Shades Crest Rd
CH-97 Columbiana Rd
Columbiana Rd

Lat/Long
33.441688°, -86.808259°

Date
Wednesday 6 February 2019

Weather
Showers
Temp: 21°C

0000 - 2400 (Weekday 24h Session)



TIME	Westbound CH-97 Shades Crest Rd			Northbound CH-97 Columbiana Rd			Southbound Columbiana Rd			Int Total	Rolling Hour
	U-Turn	Left	Right	U-Turn	Thru	Right	U-Turn	Left	Thru		
	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9		
0000 - 0015	0	4	2	0	5	0	0	0	5	16	48
0015 - 0030	0	2	1	0	2	0	0	2	10	17	37
0030 - 0045	0	2	2	0	3	0	0	0	4	11	29
0045 - 0100	0	0	0	0	1	0	0	0	3	4	26
0100 - 0115	0	0	0	0	2	0	0	0	3	5	23
0115 - 0130	0	1	0	0	2	1	0	0	5	9	20
0130 - 0145	0	0	1	0	3	0	0	0	4	8	14
0145 - 0200	0	0	1	0	0	0	0	0	0	1	10
0200 - 0215	0	0	0	0	1	0	0	1	0	2	13
0215 - 0230	0	0	0	0	1	1	0	0	1	3	17
0230 - 0245	0	2	0	0	2	0	0	0	0	4	16
0245 - 0300	0	1	1	0	2	0	0	0	0	4	20
0300 - 0315	0	0	0	0	1	0	0	1	4	6	24
0315 - 0330	0	1	0	0	0	1	0	0	0	2	28
0330 - 0345	0	1	0	0	3	0	0	0	4	8	37
0345 - 0400	0	0	0	0	2	0	0	1	4	6	47
0400 - 0415	0	0	1	0	5	0	0	1	3	10	65
0415 - 0430	0	0	0	0	5	1	0	1	4	11	74
0430 - 0445	0	0	2	0	9	4	0	0	3	18	93
0445 - 0500	0	2	0	0	8	4	0	2	10	26	130
0500 - 0515	0	1	0	0	10	3	0	0	5	19	182
0515 - 0530	0	2	0	0	13	3	0	3	9	30	247
0530 - 0545	0	1	3	0	24	7	0	1	19	55	325
0545 - 0600	0	3	3	0	31	9	0	2	30	78	467
0600 - 0615	0	4	4	0	42	8	0	2	24	84	683
0615 - 0630	0	6	2	0	48	15	0	5	32	108	974
0630 - 0645	0	7	16	0	99	24	0	6	45	197	1397
0645 - 0700	0	11	16	0	154	34	0	11	68	294	1755
0700 - 0715	0	8	24	0	212	46	0	12	73	375	1981
0715 - 0730	0	14	28	0	332	73	1	16	67	531	2120
0730 - 0745	0	12	12	0	324	103	0	27	77	555	2027
0745 - 0800	0	17	13	0	276	98	0	22	104	530	1811
0800 - 0815	0	15	21	0	285	70	0	14	99	504	1631
0815 - 0830	0	23	7	0	235	54	0	13	106	438	1498
0830 - 0845	0	14	18	0	167	45	0	18	77	339	1446
0845 - 0900	0	15	10	0	185	30	0	11	99	350	1417
0900 - 0915	0	20	10	1	206	27	0	15	92	371	1308
0915 - 0930	0	16	23	0	230	24	0	13	80	386	1144
0930 - 0945	0	19	13	0	180	32	1	9	56	310	964
0945 - 1000	0	12	12	1	88	21	0	13	88	241	831
1000 - 1015	0	13	17	0	78	18	0	19	82	207	933
1015 - 1030	0	19	9	0	76	15	0	11	76	206	995
1030 - 1045	0	17	18	0	109	23	0	12	98	277	1069
1045 - 1100	0	23	18	0	91	18	0	10	83	243	1082
1100 - 1115	0	23	9	1	89	13	0	21	113	269	1133
1115 - 1130	0	26	9	0	99	16	0	19	111	280	1151
1130 - 1145	0	22	14	0	133	14	0	8	99	292	1108
1145 - 1200	0	28	17	0	94	18	1	17	119	294	1124
1200 - 1215	0	20	15	0	102	8	0	14	128	287	1133
1215 - 1230	0	11	12	0	85	22	0	16	91	237	1135
1230 - 1245	0	21	14	0	115	27	0	16	113	306	1204
1245 - 1300	0	28	14	0	110	25	1	24	101	303	1172
1300 - 1315	0	27	16	0	107	20	0	17	102	289	1161
1315 - 1330	0	26	18	0	100	13	0	17	132	306	1182
1330 - 1345	0	15	23	0	101	24	0	18	93	274	1149
1345 - 1400	0	22	23	0	100	23	0	13	111	282	1158
1400 - 1415	0	29	27	0	104	18	0	16	116	310	1195
1415 - 1430	0	22	18	0	87	16	0	21	109	273	1191
1430 - 1445	0	25	26	0	104	16	0	8	104	283	1275
1445 - 1500	0	33	20	0	115	19	0	11	131	329	1339
1500 - 1515	0	37	20	0	113	13	0	13	110	306	1446
1515 - 1530	0	61	26	1	121	18	0	14	116	357	1621
1530 - 1545	0	43	27	0	89	11	0	23	154	347	1739
1545 - 1600	0	46	29	0	100	19	0	20	222	436	1904
1600 - 1615	0	57	19	0	143	27	0	22	213	461	1979
1615 - 1630	0	82	27	0	113	15	0	14	221	475	2074
1630 - 1645	0	96	16	0	149	14	0	10	227	512	2155
1645 - 1700	0	99	26	0	109	19	0	13	245	511	2182
1700 - 1715	0	78	35	0	173	24	0	21	245	576	2211
1715 - 1730	0	82	32	0	123	25	0	22	272	556	2041
1730 - 1745	0	66	21	0	115	26	0	18	293	539	1873
1745 - 1800	0	65	26	0	124	21	1	17	286	540	1601
1800 - 1815	0	55	18	0	103	17	0	16	197	406	1297
1815 - 1830	0	53	20	0	111	21	0	14	169	388	1081
1830 - 1845	0	27	13	0	74	20	0	10	123	267	887
1845 - 1900	0	32	5	0	76	15	0	10	98	236	830
1900 - 1915	0	17	9	0	66	12	0	16	70	180	807
1915 - 1930	0	22	7	0	49	12	0	7	97	194	795
1930 - 1945	0	21	6	0	75	9	0	10	89	210	787
1945 - 2000	0	23	13	0	61	9	0	13	94	213	680
2000 - 2015	0	25	8	0	64	12	1	1	67	178	583
2015 - 2030	0	17	11	0	69	9	0	9	71	186	535
2030 - 2045	0	12	6	0	24	10	0	7	44	103	435
2045 - 2100	0	10	4	0	43	5	0	5	49	116	409
2100 - 2115	0	12	7	0	64	6	0	2	39	130	362
2115 - 2130	0	10	5	0	31	3	0	1	36	86	305
2130 - 2145	0	5	5	0	32	2	0	2	31	77	274
2145 - 2200	0	11	4	0	24	0	0	2	28	69	247
2200 - 2215	0	10	4	0	23	3	0	2	31	73	215
2215 - 2230	0	5	1	0	18	1	0	0	30	65	175
2230 - 2245	0	2	0	0	19	3	0	2	24	50	148
2245 - 2300	0	4	4	0	12	0	0	1	16	37	127
2300 - 2315	0	4	2	0	9	2	0	1	15	33	111
2315 - 2330	0	3	3	0	10	1	0	0	11	28	
2330 - 2345	0	2	2	0	8	2	0	1	14	29	
2345 - 0000	0	0	0	0	9	1	0	0	11	21	
Grand Total	0	1882	1044	4	7742	1520	6	869	7467	28534	
Approach (%)	0.00	64.32	35.68	0.04	83.55	16.40	0.07	10.42	89.51		
Total (%)	0.00	9.17	5.08	0.02	37.70	7.40	0.03	4.23	36.36		
P/Cycle	0	0	10	0	0	0	0	0	0		
Cars	0	1868	1002	4	7669	1503	6	839	7399		
Single Unit Trucks	0	14	32	0	69	17	0	29	67		
Combination Trucks	0	0	0	0	4	0	0	1	1		
P/Cycle (%)	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00		
Cars (%)	0.00	99.26	95.98	100.00	99.06	98.88	100.00	96.55	99.09		
Single Unit Trucks (%)	0.00	0.74	3.07	0.00	0.89	1.12	0.00	3.34	0.90		
Combination Trucks (%)	0.00	0.00	0.00	0.00	0.05	0.08	0.00	0.12	0.01		

Peak Rolling Hour Flow Rates

TIME
1700 - 1715
1715 - 1730
1730 - 1745
1745 - 1800

Grand Total

Approach (%)
Total (%)
PHF
P/Cycle
Cars
Single Unit Trucks
Combination Trucks

P/Cycle (%)
Cars (%)
Single Unit Trucks (%)
Combination Trucks (%)

Westbound				Northbound				Southbound				Int Total
CH-97 Shades Crest Rd				CH-97 Columbiana Rd				Columbiana Rd				
U-Turn 4.1	Left 4.2	Right 4.3	U-Turn 4.4	Thru 4.5	Right 4.6	U-Turn 4.7	Left 4.8	Thru 4.9				
0	78	35	0	173	24	0	21	245			576	
0	82	32	0	123	25	0	22	272			556	
0	66	21	0	115	26	0	18	293			539	
0	65	26	0	124	21	1	17	286			540	
0	291	114	0	535	96	1	78	1096			2211	
0.00	71.85	28.15	0.00	84.79	15.21	0.09	6.64	93.28				
0.00	13.16	5.16	0.00	24.20	4.34	0.05	3.53	49.57				
89%			80%				94%			96%		
0%	89%	81%	0%	77%	92%	25%	89%	94%				
0	0	0	0	0	0	0	0	0			0	
0	290	110	0	535	96	1	78	1096			2206	
0	1	4	0	0	0	0	0	0			5	
0	0	0	0	0	0	0	0	0			0	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
0.00	99.66	96.49	0.00	100.00	100.00	100.00	100.00	100.00			99.77	
0.00	0.34	3.51	0.00	0.00	0.00	0.00	0.00	0.00			0.23	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	

Peak Rolling Hour Flow Rates

TIME	Eastbound				Westbound				Northbound				Southbound				Int
	Gresham Dr				Hidden Ridge Cir				Dolly Ridge Rd (South)				Dolly Ridge Rd (North)				
	U-Turn 5.1	Left 5.2	Thru 5.3	Right 5.4	U-Turn 5.5	Left 5.6	Thru 5.7	Right 5.8	U-Turn 5.9	Left 5.10	Thru 5.11	Right 5.12	U-Turn 5.13	Left 5.14	Thru 5.15	Right 5.16	
0715 - 0730	0	0	2	2	0	0	0	0	0	21	47	0	0	0	33	12	117
0730 - 0745	0	0	15	20	0	0	0	0	0	19	76	1	0	0	29	13	173
0745 - 0800	0	0	8	20	0	0	0	0	0	14	75	0	0	0	43	13	173
0800 - 0815	0	0	5	25	0	0	0	0	0	5	60	1	0	0	38	2	136
Grand Total	0	0	30	67	0	0	0	0	0	59	258	2	0	0	143	40	599
Approach (%)	0.00	0.00	30.93	69.07	0.00	0.00	0.00	0.00	0.00	18.50	80.88	0.63	0.00	0.00	78.14	21.86	
Total (%)	0.00	0.00	5.01	11.19	0.00	0.00	0.00	0.00	0.00	9.85	43.07	0.33	0.00	0.00	23.87	6.68	
PHF	69%				0%				83%				82%				87%
P/Cycle	0%	0%	50%	67%	0%	0%	0%	0%	0%	70%	85%	50%	0%	0%	83%	77%	
Cars	0	0	27	67	0	0	0	0	0	53	257	2	0	0	139	37	582
Single Unit Trucks	0	0	3	0	0	0	0	0	0	6	1	0	0	0	4	3	17
Combination Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P/Cycle (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cars (%)	0.00	0.00	90.00	100.00	0.00	0.00	0.00	0.00	0.00	89.83	99.61	100.00	0.00	0.00	97.20	92.50	97.16
Single Unit Trucks (%)	0.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	10.17	0.39	0.00	0.00	0.00	2.80	7.50	2.84
Combination Trucks (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Birmingham, AL

File Name : 280hwy17
Site Code : 00000000
Start Date : 11/28/2018
Page No : 1

Groups Printed- Unshifted

Start Time	US 280 Westbound		ROCKY RIDGE RD Northbound			US 280 Eastbound		Int. Total
	Left	Thru	Left	Right	Thru	Right		
07:00 AM	46	1072	116	34	508	34	1810	
07:15 AM	64	1092	94	28	649	47	1974	
07:30 AM	67	940	131	41	756	37	1972	
07:45 AM	95	919	122	44	915	51	2146	
Total	272	4023	463	147	2828	169	7902	
08:00 AM	52	916	115	51	700	59	1893	
08:15 AM	38	911	121	46	645	59	1820	
08:30 AM	49	937	110	47	557	35	1735	
08:45 AM	41	870	91	39	606	53	1700	
Total	180	3634	437	183	2508	206	7148	
11:00 AM	54	627	50	69	716	74	1590	
11:15 AM	78	559	63	71	731	64	1566	
11:30 AM	79	596	82	59	852	65	1733	
11:45 AM	59	715	77	56	913	77	1897	
Total	270	2497	272	255	3212	280	6786	
12:00 PM	71	643	40	46	772	78	1650	
12:15 PM	67	641	70	65	768	70	1681	
12:30 PM	62	643	75	62	728	64	1634	
12:45 PM	74	730	71	54	735	58	1722	
Total	274	2657	256	227	3003	270	6687	
04:00 PM	92	661	84	68	1099	106	2110	
04:15 PM	88	710	105	100	1033	191	2227	
04:30 PM	90	684	78	79	956	138	2025	
04:45 PM	70	744	89	57	1217	149	2326	
Total	340	2799	356	304	4305	584	8688	
05:00 PM	96	723	66	59	1135	191	2270	
05:15 PM	94	692	94	83	1187	262	2412	
05:30 PM	101	675	63	57	1098	179	2173	
05:45 PM	71	587	55	60	1316	193	2282	
Total	362	2677	278	259	4736	825	9137	
Grand Total	1698	18287	2062	1375	20592	2334	46348	
Apprch %	8.5	91.5	60.0	40.0	89.8	10.2		
Total %	3.7	39.5	4.4	3.0	44.4	5.0		

Start Time	App. Total	US 280 Westbound			ROCKY RIDGE RD Northbound			US 280 Eastbound			Int. Total
		Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1											
Intersection	07:15 AM										
Volume	0	278	3867	4145	462	164	626	3020	194	3214	7985
Percent		6.7	93.3		73.8	26.2		94.0	6.0		
07:45 Volume	0	95	919	1014	122	44	166	915	51	966	2146
Peak Factor											0.930
High Int.	6:45:00 AM	07:15 AM			07:30 AM			07:45 AM			
Volume	0	64	1092	1156	131	41	172	915	51	966	
Peak Factor				0.896			0.910			0.832	

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

File Name : 280hwy17
Site Code : 00000000
Start Date : 11/28/2018
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Start Time	App. Total	US 280 Westbound			ROCKY RIDGE RD Northbound			US 280 Eastbound			Int. Total
		Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1											
By Approach	07:00 AM	07:00 AM			07:30 AM			07:30 AM			
Volume	0	272	4023	4295	489	182	671	3016	206	3222	
Percent	-	6.3	93.7		72.9	27.1		93.6	6.4		
High Int.	-	07:15 AM			07:30 AM			07:45 AM			
Volume	-	64	1092	1156	131	41	172	915	51	966	
Peak Factor	-			0.929			0.975			0.834	
Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1											
Intersection	11:30 AM										
Volume	0	276	2595	2871	269	226	495	3305	290	3595	6961
Percent	-	9.6	90.4		54.3	45.7		91.9	8.1		
11:45 Volume	0	59	715	774	77	56	133	913	77	990	1897
Peak Factor	-										0.917
High Int.	-	11:45 AM			11:30 AM			11:45 AM			
Volume	0	59	715	774	82	59	141	913	77	990	
Peak Factor	-			0.927			0.878			0.908	
Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1											
By Approach	11:00 AM	12:00 PM			11:00 AM			11:30 AM			
Volume	0	274	2657	2931	272	255	527	3305	290	3595	
Percent	-	9.3	90.7		51.6	48.4		91.9	8.1		
High Int.	-	12:45 PM			11:30 AM			11:45 AM			
Volume	-	74	730	804	82	59	141	913	77	990	
Peak Factor	-			0.911			0.934			0.908	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1											
Intersection	04:45 PM										
Volume	0	361	2834	3195	312	256	568	4637	781	5418	9181
Percent	-	11.3	88.7		54.9	45.1		85.6	14.4		
05:15 Volume	0	94	692	786	94	83	177	1187	262	1449	2412
Peak Factor	-										0.952
High Int.	-	05:00 PM			05:15 PM			05:15 PM			
Volume	0	96	723	819	94	83	177	1187	262	1449	
Peak Factor	-			0.975			0.802			0.935	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1											
By Approach	04:00 PM	04:15 PM			04:00 PM			05:00 PM			
Volume	0	344	2861	3205	356	304	660	4736	825	5561	
Percent	-	10.7	89.3		53.9	46.1		85.2	14.8		
High Int.	-	05:00 PM			04:15 PM			05:45 PM			
Volume	-	96	723	819	105	100	205	1316	193	1509	
Peak Factor	-			0.978			0.805			0.921	

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Vestavia Hills, AL

File Name : vestavia14
Site Code : 00000000
Start Date : 05/24/2012
Page No : 1

Groups Printed- 1 - Unshifted

Start Time	HWY 31 Southbound			I-65 NB RAMPS Westbound				HWY 31 Northbound				COLUMBIANA RD Eastbound			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
07:00 AM	23	94	3	19	49	208	36	196	217	9	23	90	967		
07:15 AM	19	134	5	9	84	203	68	243	239	8	18	111	1141		
07:30 AM	23	212	9	11	92	158	119	195	229	29	19	166	1262		
07:45 AM	22	259	9	19	97	201	124	212	224	32	24	148	1371		
Total	87	699	26	58	322	770	347	846	909	78	84	515	4741		
08:00 AM	25	185	12	30	98	218	123	188	197	18	6	113	1213		
08:15 AM	19	191	5	30	67	163	98	225	175	13	14	115	1115		
08:30 AM	21	170	8	24	84	191	64	177	210	12	21	95	1077		
08:45 AM	21	184	6	29	63	204	63	152	145	9	21	108	1005		
Total	86	730	31	113	312	776	348	742	727	52	62	431	4410		
11:00 AM	27	274	4	35	47	108	52	191	136	21	18	109	1022		
11:15 AM	32	321	7	42	48	128	40	170	147	12	13	122	1082		
11:30 AM	22	289	14	53	46	121	38	172	124	17	12	121	1029		
11:45 AM	23	371	13	36	44	132	47	183	124	16	9	129	1127		
Total	104	1255	38	166	185	489	177	716	531	66	52	481	4260		
12:00 PM	29	324	11	41	46	110	48	221	155	34	15	153	1187		
12:15 PM	41	348	8	38	52	114	92	212	146	16	7	135	1209		
12:30 PM	26	439	3	40	47	194	67	241	172	20	13	122	1384		
12:45 PM	28	380	11	39	45	166	55	181	172	12	16	121	1226		
Total	124	1491	33	158	190	584	262	855	645	82	51	531	5006		
04:00 PM	19	374	12	38	73	120	53	136	155	16	12	175	1183		
04:15 PM	22	398	2	35	61	126	64	153	139	22	21	196	1239		
04:30 PM	24	396	6	44	62	135	33	140	158	22	12	180	1212		
04:45 PM	28	448	2	45	75	153	69	170	156	26	11	213	1396		
Total	93	1616	22	162	271	534	219	599	608	86	56	764	5030		
05:00 PM	27	455	3	35	73	184	30	175	224	24	27	202	1459		
05:15 PM	20	435	10	32	69	173	46	146	203	25	21	208	1388		
05:30 PM	21	444	7	27	78	262	75	230	143	24	12	185	1508		
05:45 PM	18	449	16	30	76	239	62	169	198	38	16	173	1484		
Total	86	1783	36	124	296	858	213	720	768	111	76	768	5839		
Grand Total	580	7574	186	781	1576	4011	1566	4478	4188	475	381	3490	29286		
Apprch %	7.0	90.8	2.2	12.3	24.7	63.0	15.3	43.8	40.9	10.9	8.8	80.3			
Total %	2.0	25.9	0.6	2.7	5.4	13.7	5.3	15.3	14.3	1.6	1.3	11.9			

Start Time	HWY 31 Southbound				I-65 NB RAMPS Westbound				HWY 31 Northbound				COLUMBIANA RD Eastbound				Int. Total		
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total			
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																			
Intersection	07:15 AM																		
Volume	89	790	35	914	69	371	780	1220	434	838	889	2161	87	67	538	692	4987		
Percent	9.7	86.4	3.8		5.7	30.4	63.9		20.1	38.8	41.1		12.6	9.7	77.7				
07:45																			
Volume	22	259	9	290	19	97	201	317	124	212	224	560	32	24	148	204	1371		
Peak Factor																			
High Int.	07:45 AM																		
Volume	22	259	9	290	08:00 AM				346	07:45 AM				07:30 AM				214	
Peak Factor	0.788								0.882	0.965				0.808					

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

File Name : vestavia14
Site Code : 00000000
Start Date : 05/24/2012
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Start Time	HWY 31 Southbound				I-65 NB RAMPS Westbound				HWY 31 Northbound				COLUMBIANA RD Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																	
By Approach	07:30 AM				07:45 AM				07:15 AM				07:30 AM				
Volume	89	847	35	971	103	346	773	1222	434	838	889	2161	92	63	542	697	
Percent	9.2	87.2	3.6		8.4	28.3	63.3		20.1	38.8	41.1		13.2	9.0	77.8		
High Int.	07:45 AM				08:00 AM				07:45 AM				07:30 AM				
Volume	22	259	9	290	30	98	218	346	124	212	224	560	29	19	166	214	
Peak Factor	0.837				0.883				0.965				0.814				
Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Intersection	12:00 PM																
Volume	124	1491	33	1648	158	190	584	932	262	855	645	1762	82	51	531	664	
Percent	7.5	90.5	2.0		17.0	20.4	62.7		14.9	48.5	36.6		12.3	7.7	80.0		
Volume	26	439	3	468	40	47	194	281	67	241	172	480	20	13	122	155	
Peak Factor													0.904				
High Int.	12:30 PM				12:30 PM				12:30 PM				12:00 PM				
Volume	26	439	3	468	40	47	194	281	67	241	172	480	34	15	153	202	
Peak Factor	0.880				0.829				0.918				0.822				
Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																	
By Approach	12:00 PM				12:00 PM				12:00 PM				11:45 AM				
Volume	124	1491	33	1648	158	190	584	932	262	855	645	1762	86	44	539	669	
Percent	7.5	90.5	2.0		17.0	20.4	62.7		14.9	48.5	36.6		12.9	6.6	80.6		
High Int.	12:30 PM				12:30 PM				12:30 PM				12:00 PM				
Volume	26	439	3	468	40	47	194	281	67	241	172	480	34	15	153	202	
Peak Factor	0.880				0.829				0.918				0.828				
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Intersection	05:00 PM																
Volume	86	1783	36	1905	124	296	858	1278	213	720	768	1701	111	76	768	955	
Percent	4.5	93.6	1.9		9.7	23.2	67.1		12.5	42.3	45.1		11.6	8.0	80.4		
Volume	21	444	7	472	27	78	262	367	75	230	143	448	24	12	185	221	
Peak Factor													0.968				
High Int.	05:00 PM				05:30 PM				05:30 PM				05:15 PM				
Volume	27	455	3	485	27	78	262	367	75	230	143	448	25	21	208	254	
Peak Factor	0.982				0.871				0.949				0.940				
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																	
By Approach	05:00 PM				05:00 PM				05:00 PM				04:45 PM				
Volume	86	1783	36	1905	124	296	858	1278	213	720	768	1701	99	71	808	978	
Percent	4.5	93.6	1.9		9.7	23.2	67.1		12.5	42.3	45.1		10.1	7.3	82.6		
High Int.	05:00 PM				05:30 PM				05:30 PM				05:15 PM				
Volume	27	455	3	485	27	78	262	367	75	230	143	448	25	21	208	254	
Peak Factor	0.982				0.871				0.949				0.963				

TRAFFIC DATA, LLC

1409 Turnham Lane

Birmingham, AL 35216

205-824-0125

Vestavia Hills, AL

File Name : vestavia01

Site Code : 00000000

Start Date : 05/23/2012

Page No : 1

Groups Printed- Unshifted

Start Time	HWY 31 Southbound				SHADES CREST RD Westbound				HWY 31 Northbound				SHADES CREST RD Eastbound			Int. Total
	Left	Thru	Right	urn	Left	Thru	Right	Left	Thru	Right	urn	Left	Thru	Right		
07:00 AM	7	111	6	0	21	6	62	4	369	19	0	36	4	3	648	
07:15 AM	6	158	8	0	33	21	54	10	495	16	0	55	5	2	863	
07:30 AM	9	157	6	0	32	13	65	8	477	34	0	78	12	4	895	
07:45 AM	17	172	8	0	46	14	84	7	478	28	0	90	16	4	964	
Total	39	598	28	0	132	54	265	29	1819	97	0	259	37	13	3370	
08:00 AM	12	214	12	0	39	11	58	4	512	32	0	79	13	4	990	
08:15 AM	17	167	9	0	28	12	69	5	466	22	0	55	4	4	858	
08:30 AM	16	219	10	0	20	9	51	7	388	16	0	40	16	5	797	
08:45 AM	18	192	11	0	27	10	26	6	297	29	1	43	17	5	682	
Total	63	792	42	0	114	42	204	22	1663	99	1	217	50	18	3327	
11:00 AM	18	296	17	0	20	5	7	5	232	26	0	10	9	5	650	
11:15 AM	25	331	14	0	39	11	8	10	305	29	0	16	3	8	799	
11:30 AM	17	399	14	0	33	6	12	7	270	34	0	12	6	7	817	
11:45 AM	20	339	25	0	33	13	10	3	336	25	0	6	11	15	836	
Total	80	1365	70	0	125	35	37	25	1143	114	0	44	29	35	3102	
12:00 PM	23	355	19	1	32	4	13	7	262	47	0	12	11	14	800	
12:15 PM	18	332	19	3	29	13	20	3	276	34	0	18	15	11	791	
12:30 PM	19	295	23	1	29	16	28	6	333	36	1	13	9	10	819	
12:45 PM	29	273	17	2	43	19	25	12	321	42	1	25	4	12	825	
Total	89	1255	78	7	133	52	86	28	1192	159	2	68	39	47	3235	
04:00 PM	29	419	60	1	21	8	9	13	215	44	0	13	12	3	847	
04:15 PM	32	458	61	1	37	10	3	10	299	31	0	9	12	3	966	
04:30 PM	42	479	72	0	32	11	7	10	220	29	0	18	16	9	945	
04:45 PM	57	490	83	1	37	8	11	5	242	43	0	8	22	7	1014	
Total	160	1846	276	3	127	37	30	38	976	147	0	48	62	22	3772	
05:00 PM	62	484	80	0	42	22	14	12	269	54	1	19	18	11	1088	
05:15 PM	70	531	95	1	29	22	25	6	257	37	1	26	25	14	1139	
05:30 PM	55	497	61	0	45	19	20	11	189	46	1	12	16	7	979	
05:45 PM	46	453	79	1	50	22	16	11	233	33	1	14	18	17	994	
Total	233	1965	315	2	166	85	75	40	948	170	4	71	77	49	4200	
Grand Total	664	7821	809	12	797	305	697	182	7741	786	7	707	294	184	21006	
Apprch %	7.1	84.0	8.7	0.1	44.3	17.0	38.7	2.1	88.8	9.0	0.1	59.7	24.8	15.5		
Total %	3.2	37.2	3.9	0.1	3.8	1.5	3.3	0.9	36.9	3.7	0.0	3.4	1.4	0.9		

Start Time	HWY 31 Southbound					SHADES CREST RD Westbound				HWY 31 Northbound					SHADES CREST RD Eastbound				Int. Total
	Left	Thru	Right	urn	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	urn	App. Total	Left	Thru	Right	App. Total	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																			
Intersection	07:15 AM																		
Volume	44	701	34	0	779	150	59	261	470	29	1962	110	0	2101	302	46	14	362	3712
Percent	5.6	90.0	4.4	0.0		31.9	12.6	55.5		1.4	93.4	5.2	0.0		83.4	12.7	3.9		
08:00 Volume Peak Factor	12	214	12	0	238	39	11	58	108	4	512	32	0	548	79	13	4	96	990
High Int. Volume	08:00 AM																		
Volume	12	214	12	0	238	46	14	84	144	4	512	32	0	548	90	16	4	110	0.937

Peak Factor	0.818					0.816					0.958					0.823				
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																				
By Approach	08:00 AM					07:30 AM					07:15 AM					07:30 AM				
Volume	63	792	42	0	897	145	50	276	471	29	196	110	0	2101	302	45	16	363		
Percent High Int.	7.0	88.3	4.7	0.0		30.8	10.6	58.6		1.4	93.4	5.2	0.0		83.2	12.4	4.4			
High Int.	08:30 AM					07:45 AM					08:00 AM					07:45 AM				
Volume	16	219	10	0	245	46	14	84	144	4	512	32	0	548	90	16	4	110		
Peak Factor	0.915					0.818					0.958					0.825				

Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																				
Intersection	11:15 AM																			
Volume	85	142	72	1	1582	137	34	43	214	27	117	135	0	1335	46	31	44	121	3252	
Percent High Int.	5.4	90.0	4.6	0.1		64.0	15.9	20.1		2.0	87.9	10.1	0.0		38.0	25.6	36.4			
High Int.	11:45																			
Volume	20	339	25	0	384	33	13	10	56	3	336	25	0	364	6	11	15	32	836	
Peak Factor	0.920					0.922					0.917					0.818				
High Int.	11:30 AM					11:15 AM					11:45 AM					12:00 PM				
Volume	17	399	14	0	430	39	11	8	58	3	336	25	0	364	12	11	14	37		

Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																				
By Approach	11:30 AM					12:00 PM					12:00 PM					12:00 PM				
Volume	78	142	77	4	1584	133	52	86	271	28	119	159	2	1381	68	39	47	154		
Percent High Int.	4.9	90.0	4.9	0.3		49.1	19.2	31.7		2.0	86.3	11.5	0.1		44.2	25.3	30.5			
High Int.	11:30 AM					12:45 PM					12:30 PM					12:15 PM				
Volume	17	399	14	0	430	43	19	25	87	6	333	36	1	376	18	15	11	44		
Peak Factor	0.921					0.779					0.918					0.875				

Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																				
Intersection	04:45 PM																			
Volume	244	200	319	2	2567	153	71	70	294	34	957	180	3	1174	65	81	39	185	4220	
Percent High Int.	9.5	78.0	12.4	0.1		52.0	24.1	23.8		2.9	81.5	15.3	0.3		35.1	43.8	21.1			
High Int.	05:15																			
Volume	70	531	95	1	697	29	22	25	76	6	257	37	1	301	26	25	14	65	1139	
Peak Factor	0.921					0.875					0.874					0.712				
High Int.	05:15 PM					05:30 PM					05:00 PM					05:15 PM				
Volume	70	531	95	1	697	45	19	20	84	12	269	54	1	336	26	25	14	65		

Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																				
By Approach	04:45 PM					05:00 PM					04:15 PM					05:00 PM				
Volume	244	200	319	2	2567	166	85	75	326	37	103	157	1	1225	71	77	49	197		
Percent High Int.	9.5	78.0	12.4	0.1		50.9	26.1	23.0		3.0	84.1	12.8	0.1		36.0	39.1	24.9			
High Int.	05:15 PM					05:45 PM					04:15 PM					05:15 PM				
Volume	70	531	95	1	697	50	22	16	88	10	299	31	0	340	26	25	14	65		
Peak Factor	0.921					0.926					0.901					0.758				

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Vestavia Hills, AL

File Name : vestavia05
Site Code : 00000000
Start Date : 05/17/2012
Page No : 1

Groups Printed- Unshifted

Start Time	HWY 31 Southbound				OLD CREEK TRL Westbound				HWY 31 Northbound				OLD CREEK TRL Eastbound				Int. Total
	Left	Thru	Right	turn	Left	Thru	Right	Left	Thru	Right	turn	Left	Thru	Right			
07:00 AM	1	100	6	0	1	1	1	2	388	5	0	15	0	6	526		
07:15 AM	1	181	8	0	1	0	6	3	464	6	0	19	1	9	699		
07:30 AM	3	262	6	0	6	6	10	7	492	11	0	22	3	20	848		
07:45 AM	2	271	8	0	5	2	2	13	461	21	0	30	1	14	830		
Total	7	814	28	0	13	9	19	25	1805	43	0	86	5	49	2903		
08:00 AM	3	185	6	0	4	0	3	6	452	17	0	12	1	8	697		
08:15 AM	2	197	5	0	2	1	4	9	437	13	0	13	0	5	688		
08:30 AM	6	165	7	0	1	1	1	2	301	5	1	15	0	3	508		
08:45 AM	6	170	5	0	5	0	5	5	335	10	1	16	0	1	559		
Total	17	717	23	0	12	2	13	22	1525	45	2	56	1	17	2452		
11:00 AM	4	266	6	1	3	0	3	1	266	11	2	12	3	6	584		
11:15 AM	8	319	9	2	7	3	5	3	252	11	3	6	2	6	636		
11:30 AM	9	329	7	0	6	0	4	3	287	9	0	11	1	5	671		
11:45 AM	14	345	11	3	6	0	5	2	287	12	0	5	2	5	697		
Total	35	1259	33	6	22	3	17	9	1092	43	5	34	8	22	2588		
12:00 PM	7	340	12	3	3	2	3	2	281	11	1	12	1	4	682		
12:15 PM	8	311	12	1	4	1	3	5	242	13	0	12	1	5	618		
12:30 PM	11	330	9	4	7	2	6	3	354	7	1	13	1	1	749		
12:45 PM	12	303	4	0	4	0	3	8	290	12	1	8	3	4	652		
Total	38	1284	37	8	18	5	15	18	1167	43	3	45	6	14	2701		
04:00 PM	8	413	13	1	4	1	2	6	232	8	0	9	1	6	704		
04:15 PM	13	448	11	0	6	1	5	6	281	6	1	9	0	4	791		
04:30 PM	7	437	21	1	8	5	9	5	248	11	0	16	2	5	775		
04:45 PM	11	461	20	0	5	3	3	5	269	17	1	20	5	2	822		
Total	39	1759	65	2	23	10	19	22	1030	42	2	54	8	17	3092		
05:00 PM	6	470	23	0	8	2	8	6	272	8	0	5	1	5	814		
05:15 PM	5	489	20	0	4	6	3	6	270	11	0	12	4	10	840		
05:30 PM	8	448	21	2	2	1	3	10	244	5	0	12	0	6	762		
05:45 PM	7	454	24	0	3	1	4	6	268	8	3	6	1	4	789		
Total	26	1861	88	2	17	10	18	28	1054	32	3	35	6	25	3205		
Grand Total	162	7694	274	18	105	39	101	124	7673	248	15	310	34	144	16941		
Apprch %	2.0	94.4	3.4	0.2	42.9	15.9	41.2	1.5	95.2	3.1	0.2	63.5	7.0	29.5			
Total %	1.0	45.4	1.6	0.1	0.6	0.2	0.6	0.7	45.3	1.5	0.1	1.8	0.2	0.9			

Start Time	HWY 31 Southbound					OLD CREEK TRL Westbound				HWY 31 Northbound					OLD CREEK TRL Eastbound				Int. Total
	Left	Thru	Right	turn	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	turn	App. Total	Left	Thru	Right	App. Total	
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																			
Intersection	07:15 AM																		
Volume	9	899	28	0	936	16	8	21	45	29	1869	55	0	1953	83	6	51	140	3074
Percent	1.0	96.0	3.0	0.0		35.6	17.8	46.7		1.5	95.7	2.8	0.0		59.3	4.3	36.4		
07:30 Volume	3	262	6	0	271	6	6	10	22	7	492	11	0	510	22	3	20	45	848
Peak Factor	0.906																		
High Int.	07:45 AM																		
Volume	2	271	8	0	281	6	6	10	22	7	492	11	0	510	22	3	20	45	

Peak Factor	0.833					0.511					0.957					0.778				
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																				
By Approach	07:30 AM					07:15 AM					07:15 AM					07:00 AM				
Volume	10	915	25	0	950	16	8	21	45	29	186	9	55	0	1953	86	5	49	140	
Percent High Int.	1.1	96.3	2.6	0.0		35.6	17.8	46.7		1.5	95.7	2.8	0.0			61.4	3.6	35.0		
High Int.	07:45 AM					07:30 AM					07:30 AM					07:30 AM				
Volume	2	271	8	0	281	6	6	10	22	7	492	11	0	510	22	3	20	45		
Peak Factor	0.845					0.511					0.957					0.778				

Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																					
Intersection	11:45 AM																				
Volume	40	132	6	44	11	1421	20	5	17	42	12	116	4	43	2	1221	42	5	15	62	2746
Percent	2.8	93.3	3.1	0.8			47.6	11.9	40.5		1.0	95.3	3.5	0.2			67.7	8.1	24.2		
High Int.	12:30																				
Volume	11	330	9	4	354	7	2	6	15	3	354	7	1	365	13	1	1	15	749		
Peak Factor	0.952					0.700					0.836					0.917					
High Int.	11:45 AM					12:30 PM					12:30 PM					12:15 PM					
Volume	14	345	11	3	373	7	2	6	15	3	354	7	1	365	12	1	5	18			
Peak Factor	0.952					0.700					0.836					0.861					

Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																				
By Approach	11:45 AM					11:15 AM					12:00 PM					12:00 PM				
Volume	40	132	6	44	11	1421	22	5	17	44	18	116	7	43	3	1231	45	6	14	65
Percent	2.8	93.3	3.1	0.8			50.0	11.4	38.6		1.5	94.8	3.5	0.2			69.2	9.2	21.5	
High Int.	11:45 AM					11:15 AM					12:30 PM					12:15 PM				
Volume	14	345	11	3	373	7	3	5	15	3	354	7	1	365	12	1	5	18		
Peak Factor	0.952					0.733					0.843					0.903				

Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:30 PM																				
Volume	29	185	7	84	1	1971	25	16	23	64	22	105	9	47	1	1129	53	12	22	87	3251
Percent	1.5	94.2	4.3	0.1			39.1	25.0	35.9		1.9	93.8	4.2	0.1			60.9	13.8	25.3		
High Int.	05:15																				
Volume	5	489	20	0	514	4	6	3	13	6	270	11	0	287	12	4	10	26	840		
Peak Factor	0.959					0.727					0.967					0.806					
High Int.	05:15 PM					04:30 PM					04:45 PM					04:45 PM					
Volume	5	489	20	0	514	8	5	9	22	5	269	17	1	292	20	5	2	27			

Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																				
By Approach	04:45 PM					04:30 PM					04:15 PM					04:30 PM				
Volume	30	186	8	84	2	1984	25	16	23	64	22	107	0	42	2	1136	53	12	22	87
Percent	1.5	94.2	4.2	0.1			39.1	25.0	35.9		1.9	94.2	3.7	0.2			60.9	13.8	25.3	
High Int.	05:15 PM					04:30 PM					04:15 PM					04:45 PM				
Volume	5	489	20	0	514	8	5	9	22	6	281	6	1	294	20	5	2	27		
Peak Factor	0.965					0.727					0.966					0.806				

High Int.	07:45 AM		07:15 AM		07:45 AM		07:45 AM
Volume	2 312 1 0 315	4 0 0 4	1 502 5 0 508	1 1 0 2			
Peak Factor	0.787	0.750	0.970	0.500			

Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1

By Approach	07:30 AM	08:00 AM	07:15 AM	08:00 AM
Volume	6 987 3 0 996	13 1 1 15	4 195 14 0 1972	11 0 3 14
Percent	0.6 99.1 0.3 0.0	86.7 6.7 6.7	0.2 99.1 0.7 0.0	78.6 0.0 21.4
High Int.	07:45 AM	08:45 AM	07:45 AM	08:45 AM
Volume	2 312 1 0 315	4 1 1 6	1 502 5 0 508	6 0 1 7
Peak Factor	0.790	0.625	0.970	0.500

Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1

Intersection	11:15 AM	12:00 PM	11:45 AM	12:00 PM
Volume	46 125 33 5 1339	58 3 10 71	42 114 50 1 1241	24 1 10 35 2686
Percent	3.4 93.7 2.5 0.4	81.7 4.2 14.1	3.4 92.5 4.0 0.1	68.6 2.9 28.6
High Int.	11:45 AM	12:00 PM	11:45 AM	12:00 PM
Volume	9 356 7 1 373	18 1 2 21	6 320 15 0 341	4 0 4 8 743
Peak Factor	0.897	0.807	0.910	0.673
				0.904

Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1

By Approach	11:15 AM	11:45 AM	11:00 AM	12:00 PM
Volume	46 125 33 5 1339	65 4 9 78	44 118 58 1 1283	25 3 21 49
Percent	3.4 93.7 2.5 0.4	83.3 5.1 11.5	3.4 92.0 4.5 0.1	51.0 6.1 42.9
High Int.	11:45 AM	12:00 PM	11:45 AM	12:15 PM
Volume	9 356 7 1 373	16 1 5 22	6 320 15 0 341	4 1 9 14
Peak Factor	0.897	0.886	0.941	0.875

Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1

Intersection	04:45 PM	04:45 PM	05:15 PM	05:30 PM
Volume	20 187 15 7 1914	60 3 1 64	21 112 21 1 1172	14 0 15 29 3179
Percent	1.0 97.8 0.8 0.4	93.8 4.7 1.6	1.8 96.3 1.8 0.1	48.3 0.0 51.7
High Int.	05:00 PM	04:45 PM	05:15 PM	05:30 PM
Volume	4 487 2 3 496	19 1 0 20	2 293 1 0 296	5 0 3 8 820
Peak Factor	0.965	0.800	0.961	0.806
				0.969

Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1

By Approach	04:45 PM	04:30 PM	04:30 PM	05:00 PM
Volume	20 187 15 7 1914	73 4 0 77	16 114 20 2 1187	18 2 16 36
Percent	1.0 97.8 0.8 0.4	94.8 5.2 0.0	1.3 96.8 1.7 0.2	50.0 5.6 44.4
High Int.	05:00 PM	04:30 PM	05:15 PM	05:45 PM
Volume	4 487 2 3 496	19 2 0 21	4 297 4 0 305	8 2 3 13
Peak Factor	0.965	0.917	0.973	0.692

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Vestavia Hills, AL

File Name : vestavia11
Site Code : 00000000
Start Date : 05/15/2012
Page No : 1

Groups Printed- Unshifted

Start Time	HWY 31 Southbound			PIZITZ DR Westbound			HWY 31 Northbound				VESTAVIA FOREST PL Eastbound			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	urn	Left	Thru	Right	
04:00 PM	23	348	4	45	3	36	9	258	21	2	3	2	6	760
04:15 PM	8	430	7	24	2	22	4	303	18	0	3	2	10	833
04:30 PM	11	406	1	14	1	15	6	293	26	1	2	0	11	787
04:45 PM	16	377	2	17	5	20	8	278	24	0	0	4	7	758
Total	58	1561	14	100	11	93	27	1132	89	3	8	8	34	3138
05:00 PM	13	338	4	30	2	27	13	315	28	3	1	1	7	782
05:15 PM	21	394	3	27	2	16	16	349	24	0	0	2	7	861
05:30 PM	7	343	2	22	0	11	8	297	22	2	2	1	3	720
05:45 PM	6	377	3	18	2	12	12	268	27	0	0	0	15	740
Total	47	1452	12	97	6	66	49	1229	101	5	3	4	32	3103
07:00 AM	16	108	0	15	0	17	8	386	25	1	1	3	19	599
07:15 AM	30	181	1	41	0	55	7	443	56	0	4	1	18	837
07:30 AM	70	263	4	32	6	91	21	352	52	0	8	14	10	923
07:45 AM	79	289	5	45	8	84	13	317	51	0	8	17	21	937
Total	195	841	10	133	14	247	49	1498	184	1	21	35	68	3296
08:00 AM	23	202	1	44	6	41	4	389	26	0	6	8	8	758
08:15 AM	9	213	0	17	0	21	3	408	15	0	0	1	15	702
08:30 AM	7	200	2	8	1	12	1	265	10	1	0	0	12	519
08:45 AM	11	176	2	13	0	5	4	263	8	0	0	1	14	497
Total	50	791	5	82	7	79	12	1325	59	1	6	10	49	2476
11:00 AM	7	247	2	14	2	9	3	263	5	0	0	0	10	562
11:15 AM	9	305	0	5	1	14	11	307	19	1	2	0	7	681
11:30 AM	8	275	0	12	0	18	4	284	13	0	1	0	5	620
11:45 AM	11	253	1	11	0	14	13	278	15	1	0	2	6	605
Total	35	1080	3	42	3	55	31	1132	52	2	3	2	28	2468
12:00 PM	4	300	0	27	3	16	8	273	20	1	1	1	5	659
12:15 PM	10	357	0	10	1	8	5	286	9	2	1	0	8	697
12:30 PM	14	301	0	12	0	12	4	311	9	0	2	0	8	673
12:45 PM	14	303	6	15	2	18	10	307	8	0	0	0	5	688
Total	42	1261	6	64	6	54	27	1177	46	3	4	1	26	2717
Grand Total	427	6986	50	518	47	594	195	7493	531	15	45	60	237	17198
Apprch %	5.7	93.6	0.7	44.7	4.1	51.3	2.4	91.0	6.4	0.2	13.2	17.5	69.3	
Total %	2.5	40.6	0.3	3.0	0.3	3.5	1.1	43.6	3.1	0.1	0.3	0.3	1.4	

Start Time	HWY 31 Southbound				PIZITZ DR Westbound				HWY 31 Northbound					VESTAVIA FOREST PL Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	urn	App. Total	Left	Thru	Right	App. Total	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																		
Intersection 04:30 PM																		
Volume	61	1515	10	1586	88	10	78	176	43	1235	102	4	1384	3	7	32	42	3188
Percent	3.8	95.5	0.6		50.0	5.7	44.3		3.1	89.2	7.4	0.3		7.1	16.7	76.2		
05:15 Volume	21	394	3	418	27	2	16	45	16	349	24	0	389	0	2	7	9	861
Peak Factor																		0.926
High Int.	04:30 PM				05:00 PM				05:15 PM					04:30 PM				
Volume	11	406	1	418	30	2	27	59	16	349	24	0	389	2	0	11	13	
Peak Factor	0.949				0.746				0.889					0.808				

TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

File Name : vestavia1
Site Code : 00000000
Start Date : 05/15/2012
Page No : 2

	HWY 31 Southbound				PIZITZ DR Westbound				HWY 31 Northbound					VESTAVIA FOREST PL Eastbound				Int. Total
	Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	Turn	App. Total	Left	Thru	Right	
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																		
By Approach	04:00 PM				04:00 PM				04:45 PM					04:00 PM				
Volume	58	156	14	1633	100	11	93	204	45	123	98	5	1387	8	8	34	50	
Percent	3.6	95.6	0.9		49.0	5.4	45.6		3.2	89.3	7.1	0.4		16.0	16.0	68.0		
High Int.	04:15 PM				04:00 PM				05:15 PM					04:15 PM				
Volume	8	430	7	445	45	3	36	84	16	349	24	0	389	3	2	10	15	
Peak Factor	0.917				0.607				0.891					0.833				
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																		
Intersection	07:15 AM																	
Volume	202	935	11	1148	162	20	271	453	45	150	185	0	1731	26	40	57	123	3455
Percent	17.6	81.4	1.0		35.8	4.4	59.8		2.6	86.7	10.7	0.0		21.1	32.5	46.3		
High Int.	07:45																	
Volume	79	289	5	373	45	8	84	137	13	317	51	0	381	8	17	21	46	937
Peak Factor	0.769				0.827				0.855					0.668				0.922
Peak Hour From 07:00 AM to 08:45 AM - Peak 1 of 1																		
By Approach	07:30 AM				07:15 AM				07:00 AM					07:00 AM				
Volume	181	967	10	1158	162	20	271	453	49	149	184	1	1732	21	35	68	124	
Percent	15.6	83.5	0.9		35.8	4.4	59.8		2.8	86.5	10.6	0.1		16.9	28.2	54.8		
High Int.	07:45 AM				07:45 AM				07:15 AM					07:45 AM				
Volume	79	289	5	373	45	8	84	137	7	443	56	0	506	8	17	21	46	
Peak Factor	0.776				0.827				0.856					0.674				
Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																		
Intersection	12:00 PM																	
Volume	42	126	6	1309	64	6	54	124	27	117	46	3	1253	4	1	26	31	2717
Percent	3.2	96.3	0.5		51.6	4.8	43.5		2.2	93.9	3.7	0.2		12.9	3.2	83.9		
High Int.	12:15																	
Volume	10	357	0	367	10	1	8	19	5	286	9	2	302	1	0	8	9	697
Peak Factor	0.892				0.674				0.964					0.775				0.975
Peak Hour From 11:00 AM to 12:45 PM - Peak 1 of 1																		
By Approach	12:00 PM				12:00 PM				12:00 PM					11:45 AM				
Volume	42	126	6	1309	64	6	54	124	27	117	46	3	1253	4	3	27	34	
Percent	3.2	96.3	0.5		51.6	4.8	43.5		2.2	93.9	3.7	0.2		11.8	8.8	79.4		
High Int.	12:15 PM				12:00 PM				12:45 PM					12:30 PM				
Volume	10	357	0	367	27	3	16	46	10	307	8	0	325	2	0	8	10	
Peak Factor	0.892				0.674				0.964					0.850				

Appendix B – Capacity Analysis Reports



ALABAMA DEPARTMENT OF TRANSPORTATION

Capacity Analysis for Planning of Roundabouts

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Instructions for Use

This tool is designed to provide a quick guide in determining a suitable layout for a proposed roundabout at planning level. Four predetermined hierarchical layouts—namely, 1x1 Rndabt, 1NS x 2 EW Rndabt, 2 NS x 1 EW Rndabt and 2x2 Rndabt (See Notice for details)—are evaluated for their operational performances. The evaluation follows the procedures set in the Highway Capacity Manual (2010 HCM), NCHRP Report 672 and the ALDOT Roundabout Planning, Design and Operational Manual. Final selection of a suitable layout should be based on a balanced cost and operational efficiency. The configurations presented here may be used for planning purposes only. Further analysis may be needed to achieve optimum design configuration.

Steps in using this tool:

Step 1: Go to the Input worksheet and fill in the required information located in the "Yellow" boxes.

Step 2: Go through the "Design Sheet" on the second page of each design worksheet and fill in the required information located in the "Yellow" boxes.

Step 3: Review the design on the "Result Sheet" located on the first page of each design worksheet and adjust the number of lanes (Right-turn Bypass lanes) for each approach where required.

Step 4: Go to the Output Worksheet and review the consolidated output of the different configurations.

Notes

1. Best practices suggest V/C ratio thresholds of between 0.85 and 0.90 for satisfactory performance of the roundabout during the design year. Higher degree of saturation ($V/C > 0.85$) may still perform acceptably in less critical areas (such as intersection with minor streets) where the impact of adding capacity exceeds benefit. More care may be appropriate in areas where queuing is more sensitive (e.g., closely spaced intersections, and interchange off-ramps).
2. Where a Type 2 Right-Turn Bypass lane (refer to ALDOT manual) is required, the analysis assumes zero delay and large capacity on the Bypass lane.
3. Projected Traffic Volume is the volume per day at the end of n years.
4. 1x1 Rndabt: refers to design geometry where one-lane entry conflicts with one-lane circulating lane.
5. 1NS x 2 EW Rndabt: refers to design geometry where one entry lane conflicts with two circulating lanes.
6. NS x 1 EW Rndabt: refers to design geometry where two entry lanes conflict with one circulating lanes.
7. 2x2 Rndabt: refers to design geometry where two entry lanes conflict with two circulating lanes.
8. Four SHADES OF GREEN are used to indicate different levels of acceptability of a particular performance measure; dark green indicates highly favorable and light green indicate less favorable.
9. Generally, a RED shaded cell indicate unacceptable performance measure.
10. Calibration Parameters for Capacity Equations: Refer to TABLE 2.3 in the ALDOT Roundabout Manual for values of Parameters A and B. Otherwise input site-specific values.
11. To reset the parameter values in the "Design Sheet" to their default values, simply delete the content of the cells.
13. Single-lane: refers to model parameters for the single entry lane when one-lane entry conflicts with one-lane circulating lane.
14. 2x2, RT lane: refers to model parameters for the entry right lane when two entry lanes conflict with two circulating lanes.
15. 2x2, LT lane: refers to model parameters for the entry left lane when two entry lanes conflict with two circulating lanes.
16. 2x1, RT/LT lanes: refers to model parameters for each entry lane when two entry lanes conflict with one circulating lanes.
17. 1x2, one lane: refers to model parameters for the entry lane when one entry lane conflicts with two circulating lanes.
18. Bypass Type 1a: refers to a yielding Bypass lane opposed by one exiting lane.
19. Bypass Type 1b: refers to a yielding Bypass lane opposed by two exiting lanes.
20. Bypass Type 2: refers to a non-yielding Bypass lanes that merge with exiting traffic through a downstream merging operation, no empirical model exist yet, but higher entry capacities are expected.

Disclaimer

ALDOT assumes no liability for this product content or use thereof and shall not be liable of errors resulting from the use or misuse of this product. This software product does not constitute a standard, specification, or regulation. The user accepts full responsibility.

This planning tool is based on the Capacity Analysis for Planning of Junctions (CAP-X) software developed by the Federal Highway Administration (FHWA). The CAP-X software was modified for use by Alabama Department of Transportation. Modifications include:

- i. A lane utilization function to account for lane discipline.
- ii. A function to account for pedestrian traffic.
- iii. A "future year" function to allow for user defined n years design period in the traffic growth model equation.
- iv. A function to allow for user defined parameters in the capacity model equations.
- v. A function to allow for a Right-Turn Bypass analysis.
- vi. A display function of the Right-Turn Bypass lane Measures of Effectiveness (MoE's) on each "Result Sheet".
- vii. A display function of each "Approach Delay" and the "Overall Intersection Delay" on each "Result Sheet".
- viii. A redefined color-coded output of V/C ratios, LOS and Delays.

This tool maybe updated to reflect changing practices and experience in the State. It is the responsibility of the user to check the ALDOT website periodically for updates to this tool.

Capacity Analysis for Planning of Roundabouts

Abbreviation Definition





EB	Eastbound
pc/h	Passenger Car Per Hour
PCE	Per Car Equivalent
LT,TR	Left+ Through, Through Right
L, LTR	Left , Left +Through +Right
LTR,R	Left+Through+Right, Right
NB	Northbound
RT lane	Right Lane
LT lane	Left Lane
SB	Southbound
V/C	Volume/Capacity
Veh/h	Vehicle per hour
WB	Westbound
f_{HV}	Heavy Vehicle adjustment factor
f_{ped}	Pedestrian adjustment factor
ped/h	Pedestrian per hour

Capacity Analysis for Planning of Roundabouts

Input Worksheet

Project Name:	Vestavia Hills Traffic Operations Study Phase 1
Project Number:	SA#18-0337
Location:	Vestavia Hills, Alabama
Date:	March 28, 2019

Traffic Volume Demand

	Volume (Veh/h)				Proportion of Trucks	Traffic Volume Growth Rate	n_{ped} (ped/h)	Lane Discipline: 2-Lane Approach
	U-Turn 	Left 	Thru 	Right 				
Eastbound	0	0	0	0	1.30%	1.00%	0	Not Sure
Westbound	0	230	0	272	1.30%	1.00%	0	Not Sure
Southbound	0	92	253	0	1.30%	1.00%	0	LT,TR
Northbound	0	0	597	80	1.30%	1.00%	0	LT,TR
Peak Hour Factor	1.00	0.88	0.90	0.83				
Truck to PCE Factor	2.00							
Design Period (years)	5							
Construction Year	2015							


	Demand Flow Rate (PCE)				Adjustment Factors		
	Volume (pc/h)				f_{HV}	f_{ped}	
	U-Turn	Left	Thru	Right		Single-lane entry	Multilane entry
Eastbound	0	0	0	0	0.987	1.000	1.000
Westbound	0	276	0	345	0.987	1.000	1.000
Southbound	0	110	296	0	0.987	1.000	1.000
Northbound	0	0	699	102	0.987	1.000	1.000

Notes:

- The Traffic Volume Demand input values are movement volumes for the year of construction completion
- The proportion of truck traffic and growth rate values are to be entered as percentile eg. If growth rate or proportion of truck traffic is 2%, enter 2 and not 0.02
- Growth rate values ranges from 0% to 4%. If no data available, use 0.5%
- Lane Discipline refers to existing intersection approach (2 lanes) configuration as indicated by the existing pavement markings. This may be different from the ultimate roundabout entry lane configuration depending on the traffic volume redistribution (See "Design Sheet" on subsequent worksheets). If no information is available, in the case of a new road development, select "Not Sure".
- The design period is typically 20 years as per Section 2.2.5 of ALDOT Roundabout Manual. A user may however, select a design year per their design requirements
- The Peak Hour Factor input cell default value is 0.95
- Truck to PCE factor has default value of 2.0 per section 2.2.1 of the ALDOT Roundabout Manual.

1 NS x 1 EW Roundabout

Results Sheet

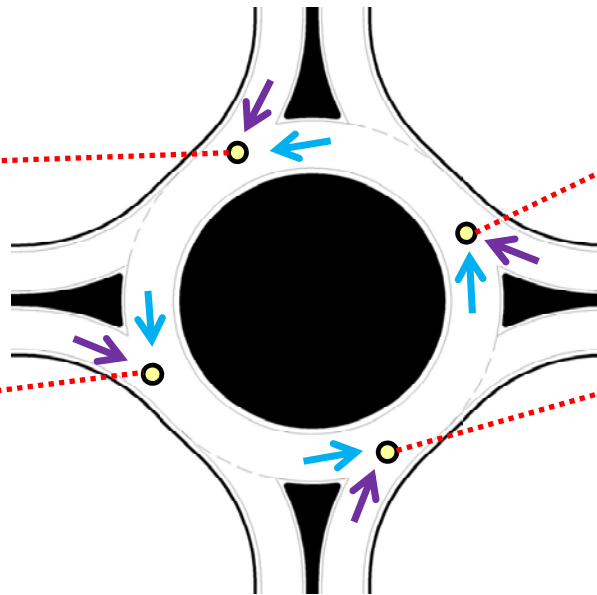
Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION	
Project Number:	SA#18-0337		
Location:	Vestavia Hills, Alabama	Overall Roundabout Delay, s/veh	21.1
Date:	March 28, 2019	Overall Roundabout LOS	C

Zone 1

Predicted approach MOE		
Lane 1	0.39	V/C
	7.7	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	7.7	

Zone 4

Predicted approach MOE		
Lane 1	0.92	V/C
	42.2	d, s/veh
	E	LOS
	13	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	42.2	



Zone 3

Predicted approach MOE		
Lane 1	0.00	V/C
	10.3	d, s/veh
	B	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	10.3	





Zone 2

Predicted approach MOE		
Lane 1	0.65	V/C
	11.5	d, s/veh
	B	LOS
	6	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	11.5	

1 NS x 1 EW Lane Roundabout

Design Sheet







Equation		$A \times \exp(-B \times Q)$		
Single-Lane	A	1380	B	0.00102
Bypass Type1a	A	1380	B	0.00102
Bypass Type1b	A	1420	B	0.00085

Right-turn Bypass Lane				
No	pc/h	pc/h	pc/h	pc/h
	0	296	110	0

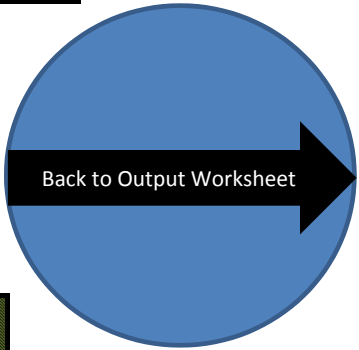
Zone 1

Predicted approach capacity	1041 pc/h
	1028 veh/h
conflicting with	276 pc/h
Conflicting flow	1 Lane
V/C RATIO	0.39









n/a	V/C RATIO	n/a	pc/h	conflicting with	veh/h	capacity	veh/h	pc/h	No	Right-turn Bypass Lane
									Type1a (yielding)	

0.92	V/C RATIO	613 veh/h	621 pc/h		345 pc/h	
1 Lane	Conflicting flow	676 pc/h	668 veh/h	276 pc/h		
	Predicted approach capacity	699 pc/h		0 pc/h		

Zone 4



Zone 3

0	pc/h	0	pc/h	0	pc/h	0	pc/h
							

1 Lane	Conflicting flow	688 pc/h	679 veh/h
	conflicting with	682 pc/h	
	Predicted approach capacity		





0	veh/h	V/C RATIO	0.00
0	pc/h		

Right-turn Bypass Lane	No	Type1a (yielding)	pc/h	n/a	veh/h	capacity	veh/h	pc/h	conflicting with	pc/h	V/C Ratio	n/a
------------------------	----	-------------------	------	-----	-------	----------	-------	------	------------------	------	-----------	-----

1 Lane	Conflicting flow	791 veh/h	801 pc/h
	Predicted approach capacity	1234 pc/h	1218 veh/h
	conflicting with	110 pc/h	

0.65	V/C RATIO	n/a	pc/h	conflicting with	n/a	veh/h	capacity	n/a	veh/h	pc/h


Zone 2

0	0	699	102
pc/h	pc/h	pc/h	pc/h
			

n/a	V/C RATIO	n/a	pc/h	conflicting with	n/a	veh/h	capacity	n/a	veh/h	pc/h
No	Type1b (yielding)	Right-turn Bypass Lane								

1 NS x 2 EW Lane Roundabout

Results Sheet

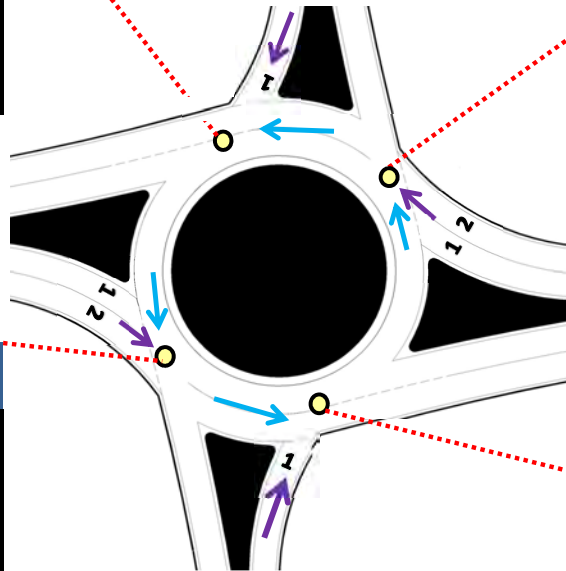
Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#18-0337	
Location:	Vestavia Hills, Alabama	Overall Roundabout Delay, s/veh
Date:	March 28, 2019	Overall Roundabout LOS

Zone 1

Predicted approach capacity		
Lane 1	0.36	V/C
	6.9	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	6.9	

Zone 4

Predicted approach capacity		
Lane 1	0.37	V/C
	9.5	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Lane 2	0.46	V/C
	11.2	d, s/veh
	B	LOS
	3	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	10.4	



Zone 3

Predicted approach capacity		
Lane 1	0.00	V/C
	4.8	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Lane 2	0.00	V/C
	4.8	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		

Zone 2

Predicted approach capacity		
Lane 1	0.62	V/C
	10.4	d, s/veh
	B	LOS
	5	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	10.4	

1 NS x 2 EW Lane Roundabout

Design Sheet

Equation		$A \times \exp(-B \times Q)$			
1 Entry, 2 Circ.	A	1420	B	0.00085	
Bypass Type1a	A	1380	B	0.00102	
Bypass Type1b	A	1420	B	0.00085	
2 Entry, 1 Circ.	A	1420	B	0.00091	

pc/h	pc/h	pc/h	pc/h
U	296	110	U

n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	pc/h	No	Right-turn Bypass Lane
V/C RATIO	conflicting with	veh/h	veh/h	capacity	veh/h	veh/h	veh/h	veh/h	veh/h	pc/h	Type1a (yielding)	

0	345	LT,R	0.56
0	345	Roundabout Entry Lane Discipline	Right turn to Total Flow Ratio
0	276		

Zone 1

Right-turn Bypass Lane	pc/h	veh/h	V/C RATIO
No	406	401	0.36
Type1a (yielding)	401		1
pc/h			
n/a			
veh/h			
n/a			
capacity			
pc/h			
n/a			
veh/h			
n/a			
conflicting with			
pc/h			
n/a			
V/C RATIO			
n/a			

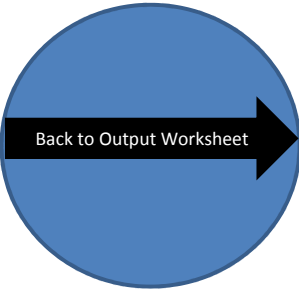
Conflicting flow	
0	
276	
Lane Cap.	pc/h veh/h
1	1123 1109

2	0.46	V/C RATIO	341	veh/h	345	pc/h	
1	0.37	V/C RATIO	273	veh/h	276	pc/h	

1	742	752	pc/h	
2	742	752	pc/h	
Lane Cap.	699		Conflicting flow	

Zone 4

0	345	pc/h	
0	276	pc/h	
0	276	pc/h	



Zone 3

0	0	0	0	0
pc/h	pc/h	pc/h	pc/h	pc/h

1	763	754
2	763	754
Lane Cap.	pc/h	veh/h
682		
Conflicting flow		

1	0.00	V/C RATIO	0	veh/h	0
2	0.00	V/C RATIO	0	veh/h	0

1	1293	1277
Lane Cap.	pc/h	veh/h
0		
110		
Conflicting flow		

1	0.62	V/C RATIO
791	veh/h	
801	pc/h	

n/a	V/C RATIO
n/a	pc/h
conflicting with	
n/a	veh/h
n/a	veh/h
pc/h	capacity
n/a	veh/h
n/a	pc/h
No	Type1b (yielding)
Right-turn Bypass Lane	


Zone 2

0	0	699	102
pc/h	pc/h	pc/h	pc/h

0	0	0
Roundabout Entry Lane Discipline	Right turn to Total Flow Ratio	LT,TR
0	0	0
0	0	#DIV/0!

2 NS x 1 EW Lane Roundabout

Results Sheet

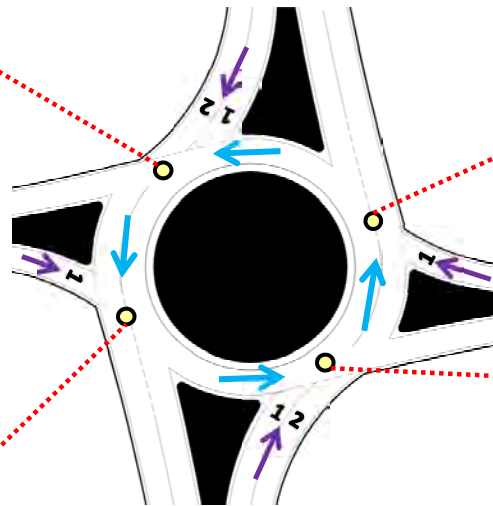
Project Name:	Vestavia Hills Traffic Operations Study Phase 1		
Project Number:	SA#18-0337	ALABAMA DEPARTMENT OF TRANSPORTATION	
Location:	Vestavia Hills, Alabama	Overall Roundabout Delay, s/veh	
Date:	March 28, 2019	Overall Roundabout LOS	

Zone 1

Predicted approach capacity		
Lane 1	0.17	V/C
	4.9	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Lane 2	0.19	V/C
	5.1	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		5.0

Zone 4

Predicted approach capacity		
Lane 1	0.79	V/C
	23.9	d, s/veh
	C	LOS
	9	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		23.9



Zone 2

Predicted approach capacity		
Lane 1	0.29	V/C
	5.5	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Lane 2	0.33	V/C
	5.9	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		5.7

Zone 3

Predicted approach capacity		
Lane 1	0.00	V/C
	4.6	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		

2 NS x 1 EW Lane Roundabout

Design Sheet

Right turn to Total Flow Ratio	0.00
Roundabout Entry Lane Discipline	LT,TR

0	215	81	110
---	-----	----	-----

pc/h	pc/h	pc/h	pc/h
0	296	110	0

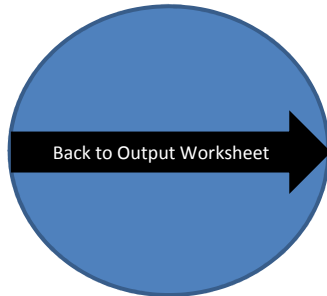
Equation		$A \times \exp(-B \times Q)$		
1 Entry, 2 Circ.	A	1420	B	0.00085
Bypass Type1a	A	1380	B	0.00102
Bypass Type1b	A	1420	B	0.00085
2 Entry, 1 Circ.	A	1420	B	0.00091

Zone 1

Right-turn Bypass Lane	pc/h	pc/h
No	215	191
Type2 (nonyielding)	veh/h	veh/h
	212	188
pc/h	V/C RATIO	V/C RATIO
n/a	0.19	0.17
veh/h	2	1
n/a		
capacity		
pc/h		
n/a		
veh/h		
n/a		
conflicting with		
pc/h		
n/a		
V/C RATIO		
n/a		

Conflicting flow	
276	
Lane Cap.	pc/h veh/h
1	1105 1090
2	1105 1090

n/a	V/C RATIO	conflicting with	n/a	veh/h	veh/h	capacity	n/a	veh/h	n/a	pc/h	No	Right-turn Bypass Lane
n/a	n/a	pc/h	n/a	n/a	n/a	0.79	n/a	n/a	n/a	613	Type1a (yielding)	
1	V/C RATIO	613	veh/h	621	pc/h							



1	774	784	376	323
Lane Cap.	pc/h	veh/h	pc/h	Conflicting flow

0	276	0	345
pc/h	pc/h	pc/h	pc/h

Zone 4

0	0	0	0	0
pc/h	pc/h	pc/h	pc/h	pc/h

215	467	1	795	785
Conflicting flow	Lane Cap.	pc/h	veh/h	veh/h

0	0	V/C RATIO	0.00	1
pc/h	veh/h			

No	Right-turn Bypass Lane
Type1b (yielding)	
pc/h	veh/h
n/a	n/a
capacity	veh/h
pc/h	n/a
n/a	veh/h
conflicting with	n/a
pc/h	n/a
n/a	veh/h
V/C Ratio	n/a

1	1285	1268
2	1285	1268
Lane Cap.	pc/h	veh/h
110		

1	2
0.29	0.33
V/C RATIO	V/C RATIO
372	419
veh/h	veh/h
376	425
pc/h	pc/h

n/a	V/C RATIO
n/a	pc/h
conflicting with	n/a
veh/h	n/a
capacity	veh/h
n/a	pc/h
veh/h	No
pc/h	Type1a (yielding)
Right-turn Bypass Lane	

Zone 2


0	0	699	102
pc/h	pc/h	pc/h	pc/h

0	376	323	102
pc/h	pc/h	pc/h	pc/h

Roundabout Entry Lane Discipline	LT,TR
Right turn to Total Flow Ratio	0.13

2 NS x 2 EW Lane Roundabout

Results Sheet

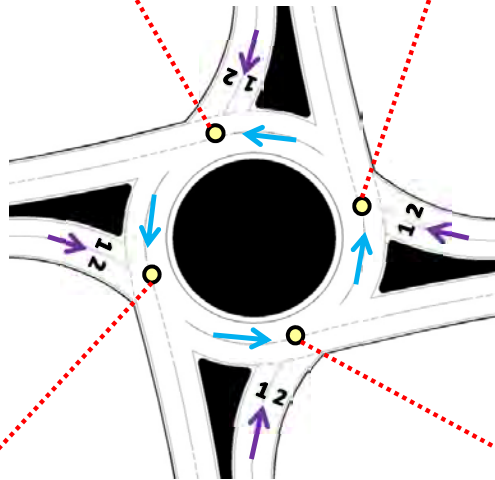
Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION	
Project Number:	SA#18-0337		Overall Roundabout Delay, s/veh
Location:	Vestavia Hills, Alabama	Overall Roundabout LOS	
Date:	March 28, 2019		

Zone 1

Predicted approach capacity		
Lane 1	0.18	V/C
	5.2	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Lane 2	0.19	V/C
	5.0	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	5.1	

Zone 4

Predicted approach capacity		
Lane 1	0.39	V/C
	10.3	d, s/veh
	B	LOS
	2	Q ₉₅ , veh
Lane 2	0.44	V/C
	10.5	d, s/veh
	B	LOS
	3	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	10.4	



Zone 3

Predicted approach capacity		
Lane 1	0.00	V/C
	5.1	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Lane 2	0.00	V/C
	4.6	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		

Zone 2

Predicted approach capacity		
Lane 1	0.31	V/C
	5.9	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Lane 2	0.33	V/C
	5.8	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	5.8	

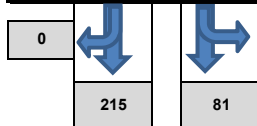
2 NS x 2 EW Lane Roundabout

Design Sheet

Equation		$A \times \exp(-B \times Q)$		
LT Lane	A	1350	B	0.00092
RT Lane	A	1420	B	0.00085
Bypass Type1a	A	1380	B	0.00102
Bypass Type1b	A	1420	B	0.00085

Right turn to Total Flow Ratio	0.00
Roundabout Entry Lane Discipline	LT,TR

pc/h	pc/h	pc/h	pc/h
0	296	110	0



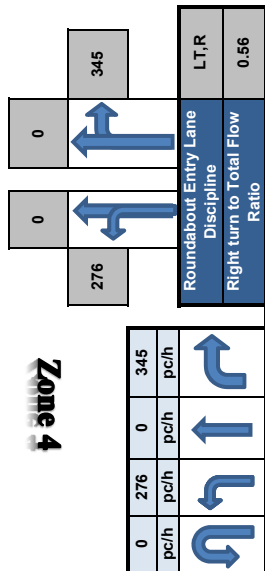
Zone 1

Right-turn Bypass Lane	pc/h	pc/h
No	215	191
Type2 (nonyielding)	212	188
pc/h	V/C RATIO	V/C RATIO
n/a	0.19	0.18
veh/h		
n/a		
capacity		
pc/h	2	1
n/a		
veh/h		
n/a		
conflicting with		
pc/h		
n/a		
V/C RATIO		
n/a		

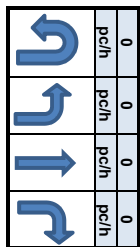
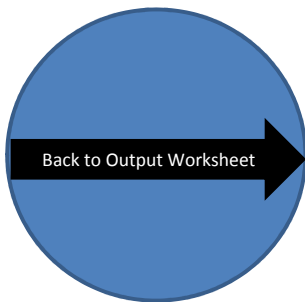
Conflicting flow	
0	276
Lane Cap.	
1	1047 1034
2	1123 1109

V/C RATIO	conflicting	with	veh/h	capacity	veh/h	pc/h	Right-turn Bypass Lane
n/a	n/a	n/a	n/a	n/a	n/a	n/a	No
n/a	n/a	n/a	n/a	n/a	n/a	n/a	Type1b (yielding)
2	0.44	V/C RATIO	341	veh/h	345	pc/h	←
1	0.39	V/C RATIO	273	veh/h	276	pc/h	←

1	701	710	veh/h	veh/h	pc/h	↗	↗
2	774	784	veh/h	veh/h	pc/h	↗	↗
Lane Cap.		376	323	Conflicting flow			



Zone 4



Zone 3

1	721	712	veh/h	veh/h	pc/h	↗	↗
2	795	785	veh/h	veh/h	pc/h	↗	↗
Lane Cap.		467	215	Conflicting flow			

V/C RATIO	0.00	1
V/C RATIO	0.00	2

Right-turn Bypass Lane	pc/h	pc/h
No	n/a	n/a
Type2 (nonyielding)	n/a	n/a
capacity	n/a	n/a
veh/h	n/a	n/a
pc/h	n/a	n/a
conflicting with	n/a	n/a
pc/h	n/a	n/a
V/C Ratio	n/a	n/a

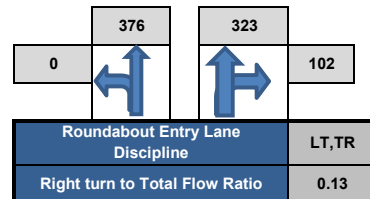
1	1220	1204	veh/h	veh/h	pc/h	↗	↗
2	1293	1277	veh/h	veh/h	pc/h	↗	↗
Lane Cap.		110	0	Conflicting flow			

V/C RATIO	0.31	0.33
V/C RATIO	372	419
veh/h	376	425
pc/h	376	425

n/a
V/C RATIO
n/a
pc/h
conflicting with
n/a
veh/h
n/a
pc/h
capacity
n/a
veh/h
n/a
pc/h
No
Type1a (yielding)
Right-turn Bypass Lane

Zone 2


0	0	699	102
pc/h	pc/h	pc/h	pc/h



Roundabout Entry Lane Discipline	LT,TR
Right turn to Total Flow Ratio	0.13

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#18-0337	
Location:	Vestavia Hills, Alabama	
Date:	March 28, 2019	

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (East)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS A		n/a	LOS B		n/a	LOS B		n/a	LOS E		n/a	LOS C	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS B		n/a	LOS A	LOS B	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS A	n/a	LOS C		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS B	LOS B	n/a	#DIV/0!	#DIV/0!



ALABAMA DEPARTMENT OF TRANSPORTATION

Capacity Analysis for Planning of Roundabouts

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Instructions for Use

This tool is designed to provide a quick guide in determining a suitable layout for a proposed roundabout at planning level. Four predetermined hierarchical layouts—namely, 1x1 Rndabt, 1NS x 2 EW Rndabt, 2 NS x 1 EW Rndabt and 2x2 Rndabt (See Notice for details)—are evaluated for their operational performances. The evaluation follows the procedures set in the Highway Capacity Manual (2010 HCM), NCHRP Report 672 and the ALDOT Roundabout Planning, Design and Operational Manual. Final selection of a suitable layout should be based on a balanced cost and operational efficiency. The configurations presented here may be used for planning purposes only. Further analysis may be needed to achieve optimum design configuration.

Steps in using this tool:

Step 1: Go to the Input worksheet and fill in the required information located in the "Yellow" boxes.

Step 2: Go through the "Design Sheet" on the second page of each design worksheet and fill in the required information located in the "Yellow" boxes.

Step 3: Review the design on the "Result Sheet" located on the first page of each design worksheet and adjust the number of lanes (Right-turn Bypass lanes) for each approach where required.

Step 4: Go to the Output Worksheet and review the consolidated output of the different configurations.

Notes

1. Best practices suggest V/C ratio thresholds of between 0.85 and 0.90 for satisfactory performance of the roundabout during the design year. Higher degree of saturation ($V/C > 0.85$) may still perform acceptably in less critical areas (such as intersection with minor streets) where the impact of adding capacity exceeds benefit. More care may be appropriate in areas where queuing is more sensitive (e.g., closely spaced intersections, and interchange off-ramps).
2. Where a Type 2 Right-Turn Bypass lane (refer to ALDOT manual) is required, the analysis assumes zero delay and large capacity on the Bypass lane.
3. Projected Traffic Volume is the volume per day at the end of n years.
4. 1x1 Rndabt: refers to design geometry where one-lane entry conflicts with one-lane circulating lane.
5. 1NS x 2 EW Rndabt: refers to design geometry where one entry lane conflicts with two circulating lanes.
6. NS x 1 EW Rndabt: refers to design geometry where two entry lanes conflict with one circulating lanes.
7. 2x2 Rndabt: refers to design geometry where two entry lanes conflict with two circulating lanes.
8. Four SHADES OF GREEN are used to indicate different levels of acceptability of a particular performance measure; dark green indicates highly favorable and light green indicate less favorable.
9. Generally, a RED shaded cell indicate unacceptable performance measure.
10. Calibration Parameters for Capacity Equations: Refer to TABLE 2.3 in the ALDOT Roundabout Manual for values of Parameters A and B. Otherwise input site-specific values.
11. To reset the parameter values in the "Design Sheet" to their default values, simply delete the content of the cells.
13. Single-lane: refers to model parameters for the single entry lane when one-lane entry conflicts with one-lane circulating lane.
14. 2x2, RT lane: refers to model parameters for the entry right lane when two entry lanes conflict with two circulating lanes.
15. 2x2, LT lane: refers to model parameters for the entry left lane when two entry lanes conflict with two circulating lanes.
16. 2x1, RT/LT lanes: refers to model parameters for each entry lane when two entry lanes conflict with one circulating lanes.
17. 1x2, one lane: refers to model parameters for the entry lane when one entry lane conflicts with two circulating lanes.
18. Bypass Type 1a: refers to a yielding Bypass lane opposed by one exiting lane.
19. Bypass Type 1b: refers to a yielding Bypass lane opposed by two exiting lanes.
20. Bypass Type 2: refers to a non-yielding Bypass lanes that merge with exiting traffic through a downstream merging operation, no empirical model exist yet, but higher entry capacities are expected.

Disclaimer

ALDOT assumes no liability for this product content or use thereof and shall not be liable of errors resulting from the use or misuse of this product. This software product does not constitute a standard, specification, or regulation. The user accepts full responsibility.

This planning tool is based on the Capacity Analysis for Planning of Junctions (CAP-X) software developed by the Federal Highway Administration (FHWA). The CAP-X software was modified for use by Alabama Department of Transportation. Modifications include:

- i. A lane utilization function to account for lane discipline.
- ii. A function to account for pedestrian traffic.
- iii. A "future year" function to allow for user defined n years design period in the traffic growth model equation.
- iv. A function to allow for user defined parameters in the capacity model equations.
- v. A function to allow for a Right-Turn Bypass analysis.
- vi. A display function of the Right-Turn Bypass lane Measures of Effectiveness (MoE's) on each "Result Sheet".
- vii. A display function of each "Approach Delay" and the "Overall Intersection Delay" on each "Result Sheet".
- viii. A redefined color-coded output of V/C ratios, LOS and Delays.

This tool maybe updated to reflect changing practices and experience in the State. It is the responsibility of the user to check the ALDOT website periodically for updates to this tool.

Capacity Analysis for Planning of Roundabouts

Abbreviation Definition





EB	Eastbound
pc/h	Passenger Car Per Hour
PCE	Per Car Equivalent
LT,TR	Left+ Through, Through Right
L, LTR	Left , Left +Through +Right
LTR,R	Left+Through+Right, Right
NB	Northbound
RT lane	Right Lane
LT lane	Left Lane
SB	Southbound
V/C	Volume/Capacity
Veh/h	Vehicle per hour
WB	Westbound
f_{HV}	Heavy Vehicle adjustment factor
f_{ped}	Pedestrian adjustment factor
ped/h	Pedestrian per hour

Capacity Analysis for Planning of Roundabouts

Input Worksheet

Project Name:	Vestavia Hills Traffic Operations Study Phase 1
Project Number:	SA#18-0337
Location:	Vestavia Hills, Alabama
Date:	March 28, 2019

Traffic Volume Demand

	Volume (Veh/h)				Proportion of Trucks	Traffic Volume Growth Rate	n_{ped} (ped/h)	Lane Discipline: 2-Lane Approach
	U-Turn 	Left 	Thru 	Right 				
Eastbound	0	0	0	0	1.30%	1.00%	0	Not Sure
Westbound	0	90	0	79	1.30%	1.00%	0	Not Sure
Southbound	0	184	320	0	1.30%	1.00%	0	LT,TR
Northbound	0	0	464	256	1.30%	1.00%	0	LT,TR
Peak Hour Factor	0.94	0.94	0.94	0.94				
Truck to PCE Factor	2.00							
Design Period (years)	5							
Construction Year	2015							


	Demand Flow Rate (PCE)				Adjustment Factors		
	Volume (pc/h)				f_{HV}	f_{ped}	
	U-Turn	Left	Thru	Right		Single-lane entry	Multilane entry
Eastbound	0	0	0	0	0.987	1.000	1.000
Westbound	0	101	0	89	0.987	1.000	1.000
Southbound	0	206	359	0	0.987	1.000	1.000
Northbound	0	0	520	287	0.987	1.000	1.000

Notes:

- The Traffic Volume Demand input values are movement volumes for the year of construction completion
- The proportion of truck traffic and growth rate values are to be entered as percentile eg. If growth rate or proportion of truck traffic is 2%, enter 2 and not 0.02
- Growth rate values ranges from 0% to 4%. If no data available, use 0.5%
- Lane Discipline refers to existing intersection approach (2 lanes) configuration as indicated by the existing pavement markings. This may be different from the ultimate roundabout entry lane configuration depending on the traffic volume redistribution (See "Design Sheet" on subsequent worksheets). If no information is available, in the case of a new road development, select "Not Sure".
- The design period is typically 20 years as per Section 2.2.5 of ALDOT Roundabout Manual. A user may however, select a design year per their design requirements
- The Peak Hour Factor input cell default value is 0.95
- Truck to PCE factor has default value of 2.0 per section 2.2.1 of the ALDOT Roundabout Manual.

1 NS x 1 EW Roundabout

Results Sheet

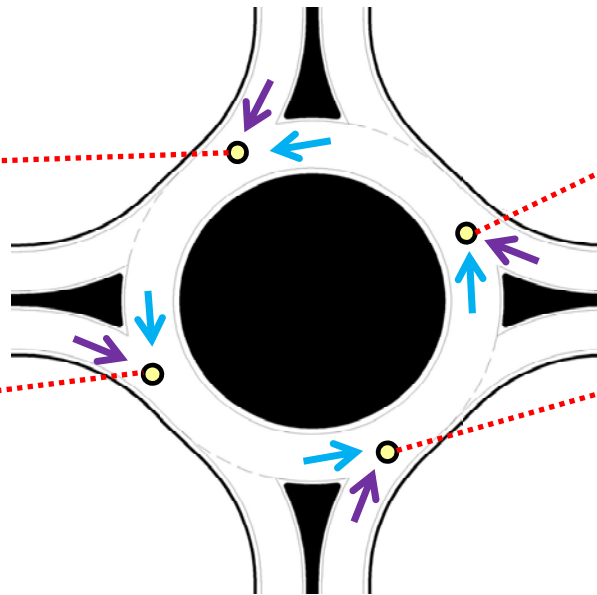
Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION	
Project Number:	SA#18-0337		
Location:	Vestavia Hills, Alabama	Overall Roundabout Delay, s/veh	11.2
Date:	March 28, 2019	Overall Roundabout LOS	B

Zone 1

Predicted approach MOE		
Lane 1	0.45	V/C
	7.6	d, s/veh
	A	LOS
	3	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	7.6	

Zone 4

Predicted approach MOE		
Lane 1	0.23	V/C
	7.0	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	7.0	



Zone 3





Predicted approach MOE		
Lane 1	0.00	V/C
	10.2	d, s/veh
	B	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	10.2	

Zone 2

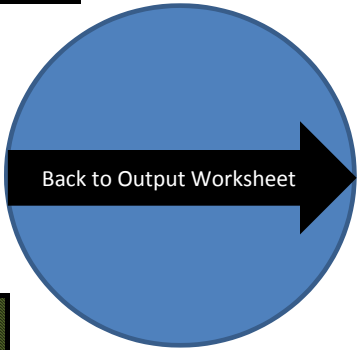
Predicted approach MOE		
Lane 1	0.72	V/C
	14.8	d, s/veh
	B	LOS
	7	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	14.8	

1 NS x 1 EW Lane Roundabout

Design Sheet

Right-turn Bypass Lane				
No	pc/h 0	pc/h 359	pc/h 206	pc/h 0
Type2 (nonyielding)	pc/h n/a	veh/h n/a	capacity pc/h n/a	veh/h n/a
conflicting with	pc/h 565	veh/h 558	V/C RATIO 0.45	
Predicted approach capacity	1245 pc/h	1229 veh/h	conflicting with 101 pc/h	Conflicting flow 1 Lane

Equation	$A \times \exp(-B \times Q)$			
Single-Lane	A	1380	B	0.00102
Bypass Type1a	A	1380	B	0.00102
Bypass Type1b	A	1420	B	0.00085



n/a	V/C RATIO	n/a	pc/h	conflicting with	veh/h	capacity	pc/h	veh/h	pc/h	No	Right-turn Bypass Lane
										Type1a (yielding)	

0.23	V/C RATIO	188	veh/h	190	pc/h	89	pc/h	101	pc/h	0	0	0

0	0	0	0	0
pc/h	pc/h	pc/h	pc/h	pc/h





1 Lane	Conflicting flow	Predicted approach capacity
		700 pc/h
		691 veh/h
	conflicting with	666 pc/h
	V/C RATIO	0.00

1 Lane	Conflicting flow	Predicted approach capacity
		812 pc/h
		802 veh/h
	conflicting with	520 pc/h

Right-turn Bypass Lane	No	Type1a (yielding)	pc/h	n/a	veh/h	capacity	pc/h	n/a	veh/h	conflicting with	pc/h	V/C Ratio	n/a
------------------------	----	-------------------	------	-----	-------	----------	------	-----	-------	------------------	------	-----------	-----


1 Lane	Conflicting flow	Predicted approach capacity
		1118 pc/h
		1104 veh/h
	conflicting with	206 pc/h
	V/C RATIO	0.72

n/a	V/C RATIO	n/a	pc/h	conflicting with	veh/h	capacity	pc/h	veh/h	pc/h	No	Right-turn Bypass Lane
										Type1b (yielding)	

0	0	520	287
pc/h	pc/h	pc/h	pc/h
			

1 NS x 2 EW Lane Roundabout

Results Sheet

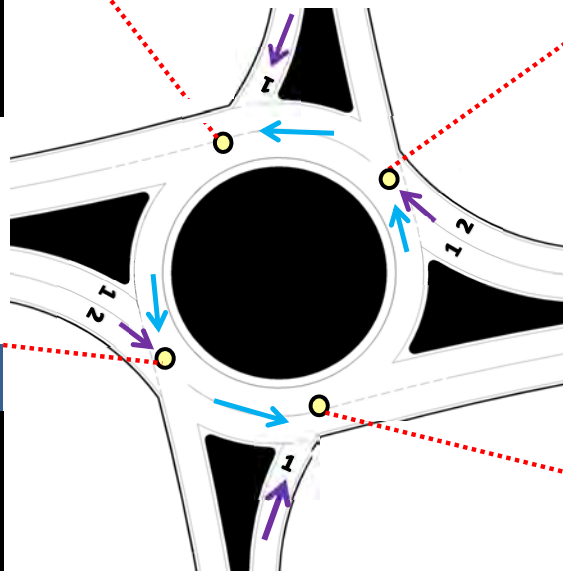
Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#18-0337	
Location:	Vestavia Hills, Alabama	Overall Roundabout Delay, s/veh
Date:	March 28, 2019	Overall Roundabout LOS

Zone 1

Predicted approach capacity		
Lane 1	0.43	V/C
	7.1	d, s/veh
	A	LOS
	3	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	7.1	

Zone 4

Predicted approach capacity		
Lane 1	0.11	V/C
	5.2	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Lane 2	0.10	V/C
	5.1	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	5.2	



Zone 3

Predicted approach capacity		
Lane 1	0.00	V/C
	4.7	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Lane 2	0.00	V/C
	4.7	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		

Zone 2

Predicted approach capacity		
Lane 1	0.68	V/C
	12.6	d, s/veh
	B	LOS
	6	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh	12.6	

1 NS x 2 EW Lane Roundabout

Design Sheet

Equation		$A \times \exp(-B \times Q)$			
1 Entry, 2 Circ.	A	1420	B	0.00085	
Bypass Type1a	A	1380	B	0.00102	
Bypass Type1b	A	1420	B	0.00085	
2 Entry, 1 Circ.	A	1420	B	0.00091	

pc/h	pc/h	pc/h	pc/h
U	359	206	U

n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	pc/h	No	Right-turn Bypass Lane
V/C RATIO	conflicting with	veh/h	veh/h	pc/h	capacity	veh/h	veh/h	veh/h	pc/h	Type1a (yielding)	

0	89	Roundabout Entry Lane Discipline Right turn to Total Flow Ratio
0	89	
0	101	L,TR 0.47

Zone 1

Right-turn Bypass Lane
No
Type1a (yielding)
pc/h
n/a
veh/h
n/a
capacity
pc/h
n/a
veh/h
n/a
conflicting with
pc/h
n/a
V/C RATIO
n/a

pc/h	565
veh/h	558
V/C RATIO	0.43
	1

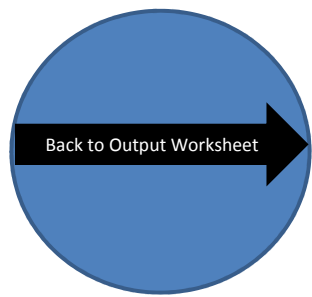
Conflicting flow	
0	
101	
Lane Cap.	pc/h veh/h
1	1303 1287

2	0.10	V/C RATIO	88	veh/h	89	pc/h	
1	0.11	V/C RATIO	100	veh/h	101	pc/h	

1	885	873	885	pc/h	
2	873	885	885	veh/h	
Lane Cap.	520			Conflicting flow	

Zone 4

0	89	pc/h	
0	101	pc/h	
0	101	pc/h	



Zone 3

0	0	0	0	0
pc/h	pc/h	pc/h	pc/h	pc/h

1	775	765
2	775	765
Lane Cap.	pc/h	veh/h
666		

1	0.00	V/C RATIO	0	veh/h	0
2	0.00	V/C RATIO	0	veh/h	0

1	1192	1177
Lane Cap.	pc/h	veh/h
0		
206		
Conflicting flow		

1	0.68	V/C RATIO
797	807	pc/h
807		veh/h

n/a	V/C RATIO
n/a	pc/h
conflicting with	
n/a	veh/h
n/a	veh/h
pc/h	capacity
n/a	veh/h
n/a	pc/h
No	Type1b (yielding)
Right-turn Bypass Lane	


Zone 2

0	0	520	287
pc/h	pc/h	pc/h	pc/h

0	0	0
Roundabout Entry Lane Discipline Right turn to Total Flow Ratio		
L,TR	0	0
#DIV/0!	0	

2 NS x 1 EW Lane Roundabout

Results Sheet

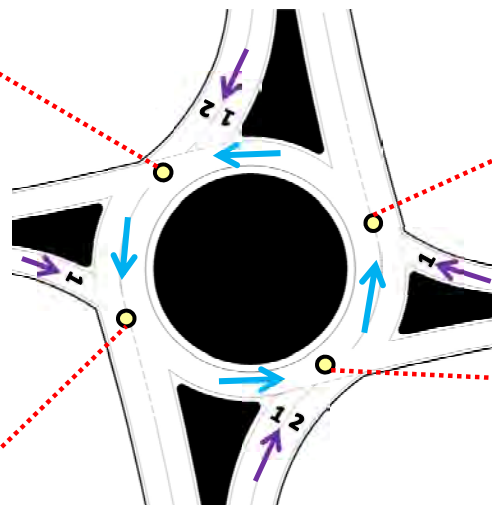
Project Name:	Vestavia Hills Traffic Operations Study Phase 1		
Project Number:	SA#18-0337	ALABAMA DEPARTMENT OF TRANSPORTATION	
Location:	Vestavia Hills, Alabama	Overall Roundabout Delay, s/veh	
Date:	March 28, 2019	Overall Roundabout LOS	

Zone 1

Predicted approach capacity		
Lane 1	0.20	V/C
	4.6	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Lane 2	0.23	V/C
	4.8	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		4.7

Zone 4

Predicted approach capacity		
Lane 1	0.21	V/C
	6.1	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		6.1



Zone 2

Predicted approach capacity		
Lane 1	0.32	V/C
	6.2	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Lane 2	0.36	V/C
	6.7	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		6.5

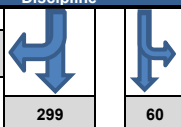
Zone 3

Predicted approach capacity		
Lane 1	0.00	V/C
	4.5	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		

2 NS x 1 EW Lane Roundabout

Design Sheet

Right turn to Total Flow Ratio	0.00
Roundabout Entry Lane Discipline	LT,TR



0	299	60	206
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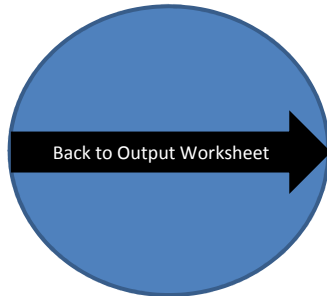
pc/h	pc/h	pc/h	pc/h
0	359	206	0

Equation		$A \times \exp(-B \times Q)$		
1 Entry, 2 Circ.	A	1420	B	0.00085
Bypass Type1a	A	1380	B	0.00102
Bypass Type1b	A	1420	B	0.00085
2 Entry, 1 Circ.	A	1420	B	0.00091

Right-turn Bypass Lane		
No	pc/h	pc/h
Type2 (nonyielding)	veh/h	veh/h
pc/h	V/C RATIO	V/C RATIO
n/a	0.23	0.20
veh/h	2	1
n/a		
capacity		
pc/h		
n/a		
veh/h		
n/a		
conflicting with		
pc/h		
n/a		
V/C RATIO		
n/a		

Conflicting flow	
101	
Lane Cap.	pc/h veh/h
1	1295 1279
2	1295 1279

n/a	V/C RATIO	conflicting with	n/a	veh/h	capacity	n/a	veh/h	n/a	pc/h	No	Right-turn Bypass Lane
n/a	n/a	pc/h	n/a	n/a	0.21	n/a	n/a	n/a	188	Type1a (yielding)	
1	0.21	V/C RATIO	188	veh/h	190	pc/h					



1	913	901	379	141
Lane Cap.	veh/h	veh/h	pc/h	Conflicting flow

89	0	101	0
pc/h	pc/h	pc/h	pc/h

0	0	0	0
pc/h	pc/h	pc/h	pc/h

Conflicting flow	
299	367
Lane Cap.	pc/h veh/h
1	806 796
0	0
veh/h	V/C RATIO
0	0.00
1	

1	1177	1162
2	1177	1162
Lane Cap.	pc/h	veh/h
206		

1	2
0.32	0.36
V/C RATIO	V/C RATIO
374	422
veh/h	veh/h
379	428
pc/h	pc/h

n/a	V/C RATIO
n/a	pc/h
conflicting with	n/a
n/a	veh/h
n/a	pc/h
capacity	n/a
n/a	veh/h
n/a	pc/h
No	Type1a (yielding)
Right-turn Bypass Lane	

Zone 2


0	0	520	287
pc/h	pc/h	pc/h	pc/h

0	379	141	287
pc/h	pc/h	pc/h	pc/h

Roundabout Entry Lane Discipline	LT,TR
Right turn to Total Flow Ratio	0.36

2 NS x 2 EW Lane Roundabout

Results Sheet

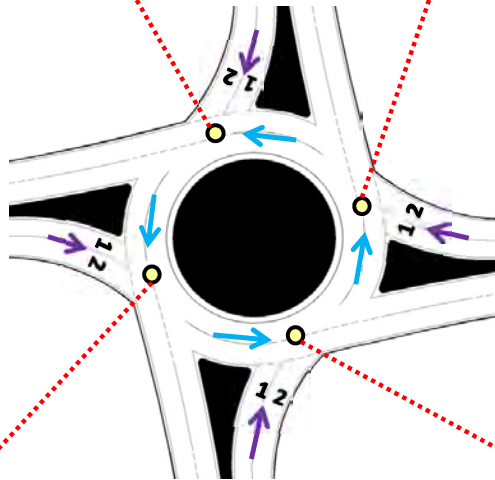
Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION	
Project Number:	SA#18-0337		Overall Roundabout Delay, s/veh
Location:	Vestavia Hills, Alabama	Overall Roundabout LOS	
Date:	March 28, 2019		

Zone 1

Predicted approach capacity		
Lane 1	0.22	V/C
	4.9	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Lane 2	0.23	V/C
	4.8	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		4.8

Zone 4

Predicted approach capacity		
Lane 1	0.12	V/C
	5.6	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Lane 2	0.10	V/C
	4.9	d, s/veh
	A	LOS
	1	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		5.3



Zone 3

Predicted approach capacity		
Lane 1	0.00	V/C
	5.0	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Lane 2	0.00	V/C
	4.5	d, s/veh
	A	LOS
	0	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		

Zone 2

Predicted approach capacity		
Lane 1	0.34	V/C
	6.6	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Lane 2	0.36	V/C
	6.6	d, s/veh
	A	LOS
	2	Q ₉₅ , veh
Right-turn Bypass	n/a	V/C
	n/a	d, s/veh
	n/a	LOS
	n/a	Q ₉₅ , veh
Approach delay, s/veh		6.6

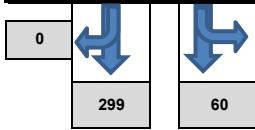
2 NS x 2 EW Lane Roundabout

Design Sheet

Equation		$A \times \exp(-B \times Q)$		
LT Lane	A	1350	B	0.00092
RT Lane	A	1420	B	0.00085
Bypass Type1a	A	1380	B	0.00102
Bypass Type1b	A	1420	B	0.00085

Right turn to Total Flow Ratio	0.00
Roundabout Entry Lane Discipline	LT,TR

pc/h	pc/h	pc/h	pc/h
0	359	206	0



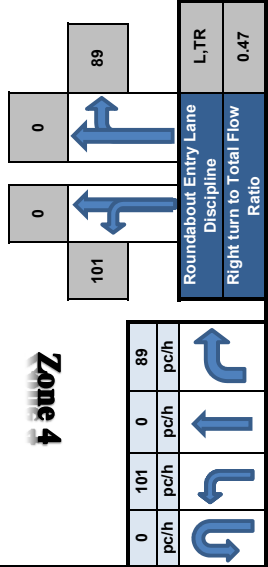
Zone 1

Right-turn Bypass Lane	pc/h	pc/h
No	299	266
Type2 (nonyielding)	296	262
pc/h	V/C RATIO	V/C RATIO
n/a	0.23	0.22
veh/h	2	1
n/a		
capacity		
pc/h		
n/a		
veh/h		
n/a		
conflicting with		
pc/h		
n/a		
V/C RATIO		
n/a		

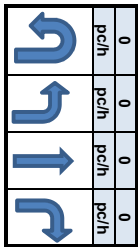
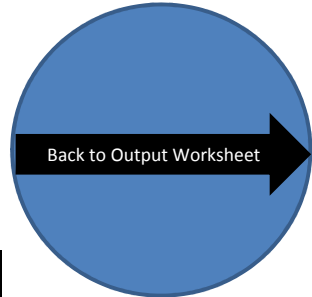
Conflicting flow	
0	
101	
Lane Cap.	
1	1230 1214
2	1303 1287

V/C RATIO	n/a	veh/h	n/a	pc/h	No	Right-turn Bypass Lane
conflicting with	n/a	n/a	n/a	n/a	Type1b (yielding)	
pc/h	n/a	veh/h	n/a	pc/h		
n/a	n/a	veh/h	n/a	pc/h		
capacity	n/a	veh/h	n/a	pc/h		
pc/h	n/a	veh/h	n/a	pc/h		
0.10	V/C RATIO	88	veh/h	89	pc/h	
0.12	V/C RATIO	100	veh/h	101	pc/h	
2						
1						

1	826	837	veh/h	913	veh/h	913	veh/h	89	pc/h
2	901	913	veh/h	101	pc/h				
Lane Cap.		379	veh/h	141	veh/h				
Conflicting flow									



Zone 4

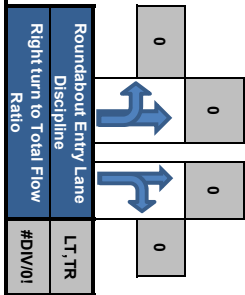


Zone 3

1	732	722	veh/h	796	veh/h
2	806	796	veh/h	0	veh/h
Lane Cap.		367	veh/h	0	veh/h
Conflicting flow		299	veh/h		

V/C RATIO	0.00	1
V/C RATIO	0.00	2

Right-turn Bypass Lane	pc/h	pc/h
No	n/a	n/a
Type2 (nonyielding)	n/a	n/a
capacity	n/a	n/a
veh/h	n/a	n/a
pc/h	n/a	n/a
conflicting with	n/a	n/a
pc/h	n/a	n/a
V/C Ratio	n/a	n/a
n/a	n/a	n/a



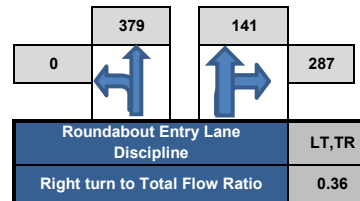
1	1117	1103	veh/h	422	veh/h
2	1192	1177	veh/h	379	veh/h
Lane Cap.		206	veh/h	0	veh/h
Conflicting flow					

V/C RATIO	0.34	1
V/C RATIO	0.36	2
374	veh/h	428
379	veh/h	428
206	veh/h	
0	veh/h	

n/a
V/C RATIO
n/a
pc/h
conflicting with
n/a
veh/h
n/a
pc/h
capacity
n/a
veh/h
n/a
pc/h
No
Type1a (yielding)
Right-turn Bypass Lane

Zone 2


0	0	520	287
pc/h	pc/h	pc/h	pc/h



Roundabout Entry Lane Discipline	LT,TR
Right turn to Total Flow Ratio	0.36

Capacity Analysis for Planning of Roundabouts

Output Worksheet

Project Name:	Vestavia Hills Traffic Operations Study Phase 1	 ALABAMA DEPARTMENT OF TRANSPORTATION
Project Number:	SA#18-0337	
Location	Vestavia Hills, Alabama	
Date	March 28, 2019	

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (West)			Zone 2 (South)			Zone 4 (East)			Consolidated LOS	Ranking
		Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane	Lane 1	Lane 2	Bypass Lane		
1.0	1 X 1	LOS A		n/a	LOS B		n/a	LOS B		n/a	LOS A		n/a	LOS B	#DIV/0!
1.2	1 X 2	LOS A		n/a	LOS A	LOS A	n/a	LOS B		n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!
1.3	2 X 1	LOS A	LOS A	n/a	LOS A		n/a	LOS A	LOS A	n/a	LOS A		n/a	#DIV/0!	#DIV/0!
1.4	2 X 2	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	LOS A	LOS A	n/a	#DIV/0!	#DIV/0!

Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM Existing
04/15/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Volume (vph)	18	7	5	104	4	158	6	707	102	68	292	13
Future Volume (vph)	18	7	5	104	4	158	6	707	102	68	292	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.978			0.920			0.981			0.994	
Flt Protected		0.971			0.981		0.950			0.950		
Satd. Flow (prot)	0	1769	0	0	1681	0	1770	1827	0	1770	1852	0
Flt Permitted		0.737			0.848		0.496			0.117		
Satd. Flow (perm)	0	1343	0	0	1453	0	924	1827	0	218	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			94			18			5	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.54	0.54	0.54	0.74	0.74	0.74	0.84	0.84	0.84	0.76	0.76	0.76
Adj. Flow (vph)	33	13	9	141	5	214	7	842	121	89	384	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	55	0	0	360	0	7	963	0	89	401	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	24.0	24.0		24.0	24.0		52.0	52.0		52.0	52.0	
Total Split (%)	31.6%	31.6%		31.6%	31.6%		68.4%	68.4%		68.4%	68.4%	
Maximum Green (s)	20.0	20.0		20.0	20.0		46.9	46.9		46.9	46.9	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		1.1	1.1		1.1	1.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		5.1	5.1		5.1	5.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.2	3.2		3.2	3.2	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)		16.6			16.6		39.2	39.2		39.2	39.2	
Actuated g/C Ratio		0.25			0.25		0.60	0.60		0.60	0.60	
v/c Ratio		0.16			0.82		0.01	0.88		0.68	0.36	
Control Delay		19.9			35.7		5.7	22.2		41.5	7.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		19.9			35.7		5.7	22.2		41.5	7.9	
LOS		B			D		A	C		D	A	
Approach Delay		19.9			35.7			22.0			14.0	
Approach LOS		B			D			C			B	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM Existing
 04/15/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		20			166		3	584		46	133	
Fuel Used(gal)		0			4		0	8		1	2	
CO Emissions (g/hr)		19			276		2	583		68	131	
NOx Emissions (g/hr)		4			54		0	113		13	25	
VOC Emissions (g/hr)		4			64		1	135		16	30	
Dilemma Vehicles (#)		0			17		0	0		0	0	
Queue Length 50th (ft)		17			118		1	320		24	81	
Queue Length 95th (ft)		24			158		5	439		#82	102	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		441			534		675	1340		159	1355	
Starvation Cap Reductn		0			0		0	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		0.12			0.67		0.01	0.72		0.56	0.30	

Intersection Summary

Area Type:	Other
Cycle Length:	76
Actuated Cycle Length:	65.5
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.88
Intersection Signal Delay:	22.5
Intersection LOS:	C
Intersection Capacity Utilization:	80.9%
ICU Level of Service:	D
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
1: Dolly Ridge Rd & Gresham Dr

2019 AM with Trip Generation

04/15/2019



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	190	371	635	258	143	56
Future Volume (vph)	190	371	635	258	143	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50	0	100			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.951	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1787	1599	1787	1881	1789	0
Flt Permitted	0.950		0.447			
Satd. Flow (perm)	1787	1599	841	1881	1789	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		640			32	
Link Speed (mph)	25			35	35	
Link Distance (ft)	737			474	400	
Travel Time (s)	20.1			9.2	7.8	
Peak Hour Factor	0.58	0.58	0.57	0.83	0.82	0.57
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	328	640	1114	311	174	98
Shared Lane Traffic (%)						
Lane Group Flow (vph)	328	640	1114	311	272	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6	6		
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	10.0	20.0	20.0	
Minimum Split (s)	16.0	16.0	14.0	24.5	24.5	
Total Split (s)	34.0	34.0	24.0	39.5	39.5	
Total Split (%)	34.9%	34.9%	24.6%	40.5%	40.5%	
Maximum Green (s)	30.0	30.0	20.0	35.0	35.0	
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0	4.0	4.0	4.5	4.5	
Recall Mode	None	None	None	Max	Max	
Act Effct Green (s)	24.0	24.0	59.7	59.2	35.1	
Actuated g/C Ratio	0.26	0.26	0.65	0.64	0.38	
v/c Ratio	0.70	0.72	1.48	0.26	0.39	
Control Delay	39.1	7.4	240.2	8.4	21.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	39.1	7.4	240.2	8.4	21.0	
LOS	D	A	F	A	C	
Approach Delay	18.2			189.6	21.0	

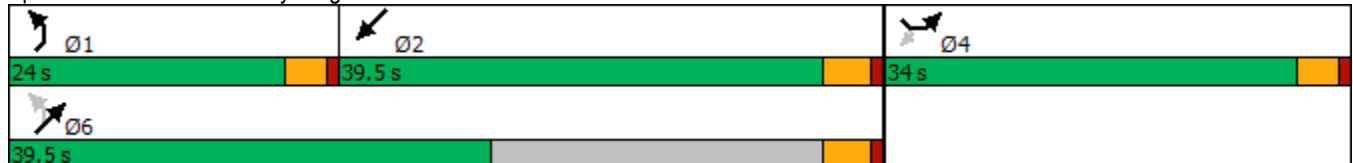


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Approach LOS	B			F	C	
Stops (vph)	163	37	305	105	124	
Fuel Used(gal)	3	3	36	2	2	
CO Emissions (g/hr)	233	212	2483	148	165	
NOx Emissions (g/hr)	45	41	483	29	32	
VOC Emissions (g/hr)	54	49	575	34	38	
Dilemma Vehicles (#)	0	0	0	10	11	
Queue Length 50th (ft)	172	0	~915	72	100	
Queue Length 95th (ft)	151	0	#466	116	158	
Internal Link Dist (ft)	657			394	320	
Turn Bay Length (ft)	50		100			
Base Capacity (vph)	586	954	754	1213	704	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.56	0.67	1.48	0.26	0.39	

Intersection Summary

Area Type: Other
 Cycle Length: 97.5
 Actuated Cycle Length: 91.8
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.48
 Intersection Signal Delay: 110.1
 Intersection LOS: F
 Intersection Capacity Utilization 72.8%
 ICU Level of Service C
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Dolly Ridge Rd & Gresham Dr



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM Existing with Trip Gen
04/15/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (vph)	18	12	5	224	6	354	6	707	405	222	292	13
Future Volume (vph)	18	12	5	224	6	354	6	707	405	222	292	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.918			0.945			0.994	
Flt Protected		0.975			0.981		0.950			0.950		
Satd. Flow (prot)	0	1782	0	0	1678	0	1770	1760	0	1770	1852	0
Flt Permitted		0.671			0.846		0.485			0.087		
Satd. Flow (perm)	0	1226	0	0	1447	0	903	1760	0	162	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			99			69			5	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.54	0.54	0.54	0.74	0.74	0.74	0.84	0.84	0.84	0.76	0.76	0.76
Adj. Flow (vph)	33	22	9	303	8	478	7	842	482	292	384	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	64	0	0	789	0	7	1324	0	292	401	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		20.0	20.0		20.0	20.0	
Total Split (s)	25.0	25.0		25.0	25.0		51.0	51.0		51.0	51.0	
Total Split (%)	32.9%	32.9%		32.9%	32.9%		67.1%	67.1%		67.1%	67.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		46.0	46.0		46.0	46.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.2	3.2		3.2	3.2	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)		20.0			20.0		46.0	46.0		46.0	46.0	
Actuated g/C Ratio		0.26			0.26		0.61	0.61		0.61	0.61	
v/c Ratio		0.19			1.74		0.01	1.21		2.98	0.36	
Control Delay		21.2			364.7		6.2	122.7		932.7	8.6	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		21.2			364.7		6.2	122.7		932.7	8.6	
LOS		C			F		A	F		F	A	
Approach Delay		21.2			364.7			122.1			398.0	
Approach LOS		C			F			F			F	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM Existing with Trip Gen
 04/15/2019

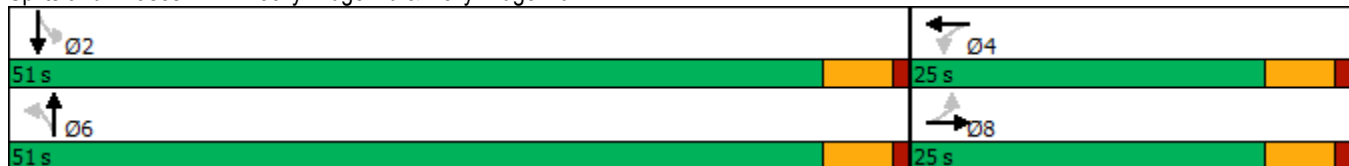


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		25			384		3	842		190	141	
Fuel Used(gal)		0			48		0	34		44	2	
CO Emissions (g/hr)		23			3352		2	2408		3053	137	
NOx Emissions (g/hr)		4			652		0	469		594	27	
VOC Emissions (g/hr)		5			777		1	558		708	32	
Dilemma Vehicles (#)		0			22		0	0		0	0	
Queue Length 50th (ft)		20			~533		1	~770		~201	84	
Queue Length 95th (ft)		28			#564		5	#908		#280	106	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		329			453		546	1092		98	1122	
Starvation Cap Reductn		0			0		0	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		0.19			1.74		0.01	1.21		2.98	0.36	

Intersection Summary

Area Type:	Other
Cycle Length:	76
Actuated Cycle Length:	76
Natural Cycle:	45
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	2.98
Intersection Signal Delay:	252.9
Intersection LOS:	F
Intersection Capacity Utilization:	126.2%
ICU Level of Service:	H
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Intersection												
Int Delay, s/veh	327.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	230	0	272	0	597	80	92	253	0
Future Vol, veh/h	0	0	0	230	0	272	0	597	80	92	253	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	86	86	86	75	75	75	87	87	87
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	0	0	267	0	316	0	796	107	106	291	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1353	1406	291	1353	1353	850	291	0	0	903	0	0
Stage 1	503	503	-	850	850	-	-	-	-	-	-	-
Stage 2	850	903	-	503	503	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	128	140	751	~ 128	151	362	1276	-	-	757	-	-
Stage 1	553	543	-	357	378	-	-	-	-	-	-	-
Stage 2	357	357	-	553	543	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	14	117	751	~ 112	126	362	1276	-	-	757	-	-
Mov Cap-2 Maneuver	14	117	-	~ 112	126	-	-	-	-	-	-	-
Stage 1	553	452	-	357	378	-	-	-	-	-	-	-
Stage 2	45	357	-	461	452	-	-	-	-	-	-	-





























Approach	EB	WB	NB	SB
HCM Control Delay, s	0	\$ 1054.2	0	2.8
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1276	-	-	-	181	757	-
HCM Lane V/C Ratio	-	-	-	-	3.225	0.14	-
HCM Control Delay (s)	0	-	-	\$ 1054.2	10.5	0	-
HCM Lane LOS	A	-	-	A	F	B	A
HCM 95th %tile Q(veh)	0	-	-	-	54.4	0.5	-

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
3: US-31 & I-65 NB Ramps & Columbiana Rd

2019 AM
03/18/2019

												
Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations				 	 			 				 
Traffic Volume (vph)	71	384	808	449	838	889	92	818	36	90	69	557
Future Volume (vph)	71	384	808	449	838	889	92	818	36	90	69	557
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175	0	400	0	0	360	0	230	0	230	0	230
Storage Lanes	1	2	2	1	1	1	1	1	2	1	2	1
Taper Length (ft)	25	0	25	0	0	25	0	25	0	25	0	25
Lane Util. Factor	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88
Frt		0.850	0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1770	1583	1583	3433	3539	1583	1770	3539	1583	1770	1770	2787
Flt Permitted	0.950			0.126			0.250			0.950	0.950	
Satd. Flow (perm)	1770	1583	1583	455	3539	1583	466	3539	1583	1770	1770	2787
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			362			666			56			688
Link Speed (mph)	25			40			40			40		40
Link Distance (ft)	478			683			562			543		543
Travel Time (s)	13.0			11.6			9.6			9.3		9.3
Peak Hour Factor	0.88	0.88	0.88	0.96	0.96	0.96	0.79	0.79	0.79	0.81	0.81	0.81
Adj. Flow (vph)	81	436	918	468	873	926	116	1035	46	111	85	688
Shared Lane Traffic (%)												
Lane Group Flow (vph)	81	436	918	468	873	926	116	1035	46	111	85	688
Turn Type	Prot	Perm	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	Prot	Perm
Protected Phases	8			5	2		1	6		4	4	
Permitted Phases		8	8	2		2	6		6			4
Detector Phase	8	8	8	5	2	2	1	6	6	4	4	4
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0	7.0	7.0	7.0
Minimum Split (s)	12.0	12.0	12.0	11.5	25.0	25.0	12.0	25.0	25.0	12.0	12.0	12.0
Total Split (s)	45.0	45.0	45.0	45.0	100.0	100.0	45.0	100.0	100.0	25.0	25.0	25.0
Total Split (%)	20.9%	20.9%	20.9%	20.9%	46.5%	46.5%	20.9%	46.5%	46.5%	11.6%	11.6%	11.6%
Maximum Green (s)	40.0	40.0	40.0	41.0	95.0	95.0	40.5	95.0	95.0	20.5	20.5	20.5
Yellow Time (s)	4.0	4.0	4.0	3.5	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	0.5	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.5	5.0	5.0	4.5	4.5	4.5
Lead/Lag				Lead	Lag	Lag	Lead	Lag	Lag			
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	Yes	Yes			
Vehicle Extension (s)	4.0	4.0	4.0	4.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Min	Min	None	Min	Min	None	None	None
Act Effct Green (s)	40.9	40.9	40.9	94.7	78.6	78.6	81.2	70.1	70.1	16.2	16.2	16.2
Actuated g/C Ratio	0.25	0.25	0.25	0.57	0.47	0.47	0.49	0.42	0.42	0.10	0.10	0.10
v/c Ratio	0.19	1.12	1.38	0.77	0.52	0.84	0.37	0.69	0.07	0.65	0.49	0.77
Control Delay	56.9	135.9	208.6	32.0	31.2	17.5	20.3	41.2	4.6	92.9	84.9	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.9	135.9	208.6	32.0	31.2	17.5	20.3	41.2	4.6	92.9	84.9	11.2
LOS	E	F	F	C	C	B	C	D	A	F	F	B
Approach Delay	178.0				25.8			37.8			28.6	
Approach LOS	F				C			D			C	

Lanes, Volumes, Timings
 3: US-31 & I-65 NB Ramps & Columbiana Rd

2019 AM
 03/18/2019



Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Stops (vph)	56	293	356	230	555	296	44	637	3	84	63	38
Fuel Used(gal)	1	13	39	7	15	10	1	16	0	3	2	4
CO Emissions (g/hr)	93	931	2725	508	1024	713	81	1136	14	200	144	259
NOx Emissions (g/hr)	18	181	530	99	199	139	16	221	3	39	28	50
VOC Emissions (g/hr)	21	216	631	118	237	165	19	263	3	46	33	60
Dilemma Vehicles (#)	0	0	0	0	22	0	0	19	0	0	0	0
Queue Length 50th (ft)	77	~613	~1097	130	344	288	57	476	0	126	95	0
Queue Length 95th (ft)	136	#889	#1400	204	428	554	80	503	13	185	147	14
Internal Link Dist (ft)	398				603			482				463
Turn Bay Length (ft)	175			400			360		230			230
Base Capacity (vph)	436	390	663	1014	2075	1203	591	2075	951	224	224	953
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	1.12	1.38	0.46	0.42	0.77	0.20	0.50	0.05	0.50	0.38	0.72

Intersection Summary

Area Type: Other
 Cycle Length: 215
 Actuated Cycle Length: 165.6
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.38
 Intersection Signal Delay: 66.5
 Intersection LOS: E
 Intersection Capacity Utilization 81.5%
 ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: US-31 & I-65 NB Ramps & Columbiana Rd

Ø1 45 s	Ø2 100 s	Ø4 25 s	Ø8 45 s
Ø5 45 s	Ø6 100 s		

Lanes, Volumes, Timings
1: US-31 & Shades Crest Rd

2019 AM
03/18/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↖	↗		↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	313	48	14	155	61	270	30	2032	114	46	726	35
Future Volume (vph)	313	48	14	155	61	270	30	2032	114	46	726	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	35		0	300		175	0		375
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.995			0.878				0.850			0.850
Flt Protected		0.960		0.950			0.950			0.950		
Satd. Flow (prot)	0	1779	0	1770	1635	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.146		0.735			0.276			0.030		
Satd. Flow (perm)	0	271	0	1369	1635	0	514	3539	1583	56	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			104				36			43
Link Speed (mph)		30			30			45				45
Link Distance (ft)		482			504			393				502
Travel Time (s)		11.0			11.5			6.0				7.6
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.96	0.96	0.96	0.82	0.82	0.82
Adj. Flow (vph)	382	59	17	189	74	329	31	2117	119	56	885	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	458	0	189	403	0	31	2117	119	56	885	43
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1		6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	29.5	29.5		29.5	29.5		12.0	25.0	25.0	12.0	25.0	25.0
Total Split (s)	60.0	60.0		50.0	50.0		20.0	130.0	130.0	20.0	130.0	130.0
Total Split (%)	28.6%	28.6%		23.8%	23.8%		9.5%	61.9%	61.9%	9.5%	61.9%	61.9%
Maximum Green (s)	55.5	55.5		45.5	45.5		15.5	125.0	125.0	15.5	125.0	125.0
Yellow Time (s)	3.5	3.5		3.5	3.5		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		0.5	1.0	1.0	0.5	1.0	1.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5		4.5	4.5		4.5	5.0	5.0	4.5	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0							
Flash Dont Walk (s)	18.0	18.0		18.0	18.0							
Pedestrian Calls (#/hr)	0	0		0	0							
Act Effct Green (s)		55.5		55.5	55.5		139.2	131.0	131.0	143.7	135.1	135.1
Actuated g/C Ratio		0.26		0.26	0.26		0.66	0.62	0.62	0.68	0.64	0.64
v/c Ratio		6.36		0.52	0.79		0.08	0.96	0.12	0.49	0.39	0.04
Control Delay		2451.6		72.1	65.3		10.7	48.6	11.7	42.4	18.8	3.5
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		2451.6		72.1	65.3		10.7	48.6	11.7	42.4	18.8	3.5

Lanes, Volumes, Timings
1: US-31 & Shades Crest Rd

2019 AM
03/18/2019

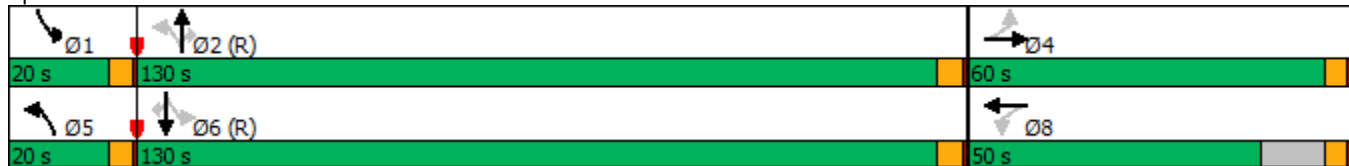


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F		E	E		B	D	B	D	B	A
Approach Delay		2451.6			67.5			46.1			19.5	
Approach LOS		F			E			D			B	
Stops (vph)		254		132	237		10	1757	32	21	336	3
Fuel Used(gal)		190		4	7		0	47	1	1	9	0
CO Emissions (g/hr)		13315		253	489		19	3295	67	56	652	12
NOx Emissions (g/hr)		2591		49	95		4	641	13	11	127	2
VOC Emissions (g/hr)		3086		59	113		4	764	16	13	151	3
Dilemma Vehicles (#)		0		0	0		0	47	0	0	17	0
Queue Length 50th (ft)		~1120		226	403		13	1391	44	25	306	0
Queue Length 95th (ft)		#1227		288	474		26	#1681	81	69	315	15
Internal Link Dist (ft)		402			424			313			422	
Turn Bay Length (ft)				35			300		175			375
Base Capacity (vph)		72		361	508		447	2207	1000	165	2276	1033
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		6.36		0.52	0.79		0.07	0.96	0.12	0.34	0.39	0.04

Intersection Summary




















Area Type: Other
 Cycle Length: 210
 Actuated Cycle Length: 210
 Offset: 51 (24%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 6.36
 Intersection Signal Delay: 299.1
 Intersection LOS: F
 Intersection Capacity Utilization 108.4%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: US-31 & Shades Crest Rd



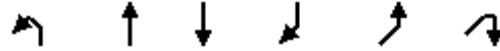
Lanes, Volumes, Timings
1: Rocky Ridge Rd & US-280

2019 AM
03/18/2019

						
Lane Group	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations	 	  	  		  	
Traffic Volume (vph)	274	3867	3020	191	448	159
Future Volume (vph)	274	3867	3020	191	448	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350			0	100	100
Storage Lanes	2			1	1	1
Taper Length (ft)	75				75	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.94	1.00
Fr't				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	5085	5085	1583	4990	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	5085	5085	1583	4990	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				79		88
Link Speed (mph)		55	55		40	
Link Distance (ft)		616	491		414	
Travel Time (s)		7.6	6.1		7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	298	4203	3283	208	487	173
Shared Lane Traffic (%)						
Lane Group Flow (vph)	298	4203	3283	208	487	173
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	12.0	12.0	12.0	8.0	8.0
Minimum Split (s)	12.5	24.5	24.5	24.5	22.5	22.5
Total Split (s)	40.0	200.0	160.0	160.0	40.0	40.0
Total Split (%)	16.7%	83.3%	66.7%	66.7%	16.7%	16.7%
Maximum Green (s)	35.5	193.5	153.5	153.5	35.5	35.5
Yellow Time (s)	3.5	5.5	5.5	5.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	6.5	6.5	6.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	25.4	193.5	163.6	163.6	28.1	28.1
Actuated g/C Ratio	0.11	0.83	0.70	0.70	0.12	0.12
v/c Ratio	0.79	0.99	0.92	0.18	0.81	0.65
Control Delay	116.8	31.0	34.8	8.2	110.8	58.5
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.2
Total Delay	116.8	31.0	34.8	8.2	111.1	58.7

Lanes, Volumes, Timings
1: Rocky Ridge Rd & US-280

2019 AM
03/18/2019

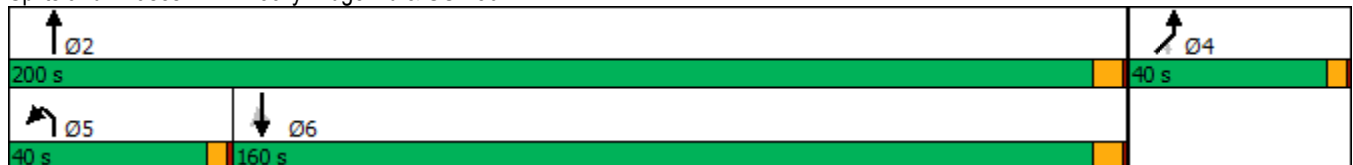


Lane Group	NBL	NBT	SBT	SBR	NEL	NER
LOS	F	C	C	A	F	E
Approach Delay		36.7	33.3		97.4	
Approach LOS		D	C		F	
Stops (vph)	263	3074	2378	40	431	75
Fuel Used(gal)	12	97	75	2	16	3
CO Emissions (g/hr)	872	6753	5242	116	1091	215
NOx Emissions (g/hr)	170	1314	1020	23	212	42
VOC Emissions (g/hr)	202	1565	1215	27	253	50
Dilemma Vehicles (#)	0	81	19	0	0	0
Queue Length 50th (ft)	234	2025	1478	61	263	128
Queue Length 95th (ft)	295	#2509	1793	118	311	227
Internal Link Dist (ft)		536	411		334	
Turn Bay Length (ft)	350				100	100
Base Capacity (vph)	524	4231	3577	1136	761	316
Starvation Cap Reductn	0	0	0	0	39	9
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.99	0.92	0.18	0.67	0.56

Intersection Summary

Area Type: Other
 Cycle Length: 240
 Actuated Cycle Length: 232.6
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 39.9
 Intersection LOS: D
 Intersection Capacity Utilization 92.4%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & US-280



Lanes, Volumes, Timings
2: Rocky Ridge Rd & Shades Crest Rd

2019 AM
03/18/2019



Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	151	22	7	456	294	171
Future Volume (vph)	151	22	7	456	294	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	100	125			0
Storage Lanes	1	1	1			1
Taper Length (ft)	75		75			
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950			0.999		
Satd. Flow (prot)	1770	1583	0	3536	1863	1583
Flt Permitted	0.950			0.950		
Satd. Flow (perm)	1770	1583	0	3362	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		24				186
Link Speed (mph)	25			40	40	
Link Distance (ft)	484			376	414	
Travel Time (s)	13.2			6.4	7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	164	24	8	496	320	186
Shared Lane Traffic (%)						
Lane Group Flow (vph)	164	24	0	504	320	186
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases		4	6			2
Detector Phase	4	4	6	6	2	2
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	12.0	12.0	12.0
Minimum Split (s)	22.5	22.5	23.0	23.0	23.0	23.0
Total Split (s)	33.0	33.0	44.0	44.0	44.0	44.0
Total Split (%)	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Maximum Green (s)	28.7	28.7	39.0	39.0	39.0	39.0
Yellow Time (s)	3.1	3.1	3.8	3.8	3.8	3.8
All-Red Time (s)	1.2	1.2	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.3	4.3		5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	28.7	28.7		39.0	39.0	39.0
Actuated g/C Ratio	0.37	0.37		0.51	0.51	0.51
v/c Ratio	0.25	0.04		0.30	0.34	0.21
Control Delay	18.0	6.9		11.6	12.6	2.4
Queue Delay	0.0	0.0		0.0	0.0	0.0
Total Delay	18.0	6.9		11.6	12.6	2.4

Lanes, Volumes, Timings
 2: Rocky Ridge Rd & Shades Crest Rd

2019 AM
 03/18/2019

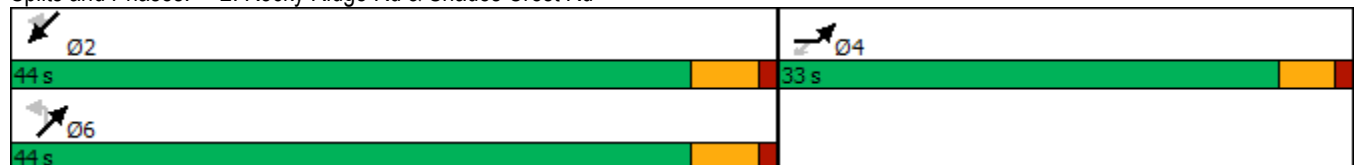


Lane Group	EBL	EBR	NEL	NET	SWT	SWR
LOS	B	A		B	B	A
Approach Delay	16.6			11.6	8.8	
Approach LOS	B			B	A	
Stops (vph)	100	6		253	165	16
Fuel Used(gal)	2	0		5	3	1
CO Emissions (g/hr)	109	10		333	224	50
NOx Emissions (g/hr)	21	2		65	44	10
VOC Emissions (g/hr)	25	2		77	52	12
Dilemma Vehicles (#)	0	0		30	19	0
Queue Length 50th (ft)	53	0		69	86	0
Queue Length 95th (ft)	96	14		100	139	29
Internal Link Dist (ft)	404			296	334	
Turn Bay Length (ft)		100				
Base Capacity (vph)	659	605		1702	943	893
Starvation Cap Reductn	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.25	0.04		0.30	0.34	0.21

Intersection Summary

Area Type: Other
 Cycle Length: 77
 Actuated Cycle Length: 77
 Natural Cycle: 50
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.34
 Intersection Signal Delay: 11.2
 Intersection LOS: B
 Intersection Capacity Utilization 33.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: Rocky Ridge Rd & Shades Crest Rd



Intersection						
Int Delay, s/veh	178.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑↑	↑	↑	↑↑
Traffic Vol, veh/h	291	114	537	96	78	1097
Future Vol, veh/h	291	114	537	96	78	1097
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	-	-	160	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	80	80	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	327	128	671	120	83	1167

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1421	336	0	0	671
Stage 1	671	-	-	-	-
Stage 2	750	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22
Pot Cap-1 Maneuver	~ 127	660	-	-	915
Stage 1	470	-	-	-	-
Stage 2	427	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	~ 115	660	-	-	915
Mov Cap-2 Maneuver	~ 115	-	-	-	-
Stage 1	470	-	-	-	-
Stage 2	388	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	978.7	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	150	915
HCM Lane V/C Ratio	-	-	3.034	0.091
HCM Control Delay (s)	-	-	978.7	9.3
HCM Lane LOS	-	-	F	A
HCM 95th %tile Q(veh)	-	-	42.2	0.3

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
 1: Columbiana Rd & Shades Crest Rd/Vestaview Ln

2019 PM Signalized
 03/19/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕	↗	↗	↕	↗
Traffic Volume (vph)	65	88	13	113	166	108	28	460	115	199	894	295
Future Volume (vph)	65	88	13	113	166	108	28	460	115	199	894	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	115		0	140		350
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.989			0.962				0.850			0.850
Flt Protected		0.981			0.986		0.950			0.950		
Satd. Flow (prot)	0	1807	0	0	1767	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.676			0.833		0.950			0.300		
Satd. Flow (perm)	0	1245	0	0	1493	0	1770	3539	1583	559	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			17				142			304
Link Speed (mph)		30			30			45				45
Link Distance (ft)		493			298			271				469
Travel Time (s)		11.2			6.8			4.1				7.1
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.81	0.81	0.81	0.97	0.97	0.97
Adj. Flow (vph)	74	100	15	123	180	117	35	568	142	205	922	304
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	189	0	0	420	0	35	568	142	205	922	304
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	18.0	18.0	5.0	18.0	18.0
Minimum Split (s)	23.0	23.0		22.5	22.5		12.0	23.5	23.5	12.0	23.5	23.5
Total Split (s)	46.0	46.0		46.0	46.0		23.0	52.0	52.0	18.0	52.0	52.0
Total Split (%)	38.0%	38.0%		38.0%	38.0%		19.0%	43.0%	43.0%	14.9%	43.0%	43.0%
Maximum Green (s)	40.0	40.0		40.0	40.0		17.0	46.5	46.5	12.0	46.5	46.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.5	2.5		2.5	2.5		3.0	1.5	1.5	3.0	1.5	1.5
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0			6.0		6.0	5.5	5.5	6.0	5.5	5.5
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.5	3.5	2.0	3.5	3.5
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	10.0	10.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		29.9			29.9		6.7	28.6	28.6	43.8	38.4	38.4
Actuated g/C Ratio		0.34			0.34		0.08	0.33	0.33	0.50	0.44	0.44
v/c Ratio		0.44			0.81		0.26	0.49	0.23	0.49	0.59	0.35
Control Delay		27.3			39.7		50.4	25.7	5.1	16.9	23.3	3.8
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		27.3			39.7		50.4	25.7	5.1	16.9	23.3	3.8

Lanes, Volumes, Timings
 1: Columbiana Rd & Shades Crest Rd/Vestaview Ln

2019 PM Signalized
 03/19/2019

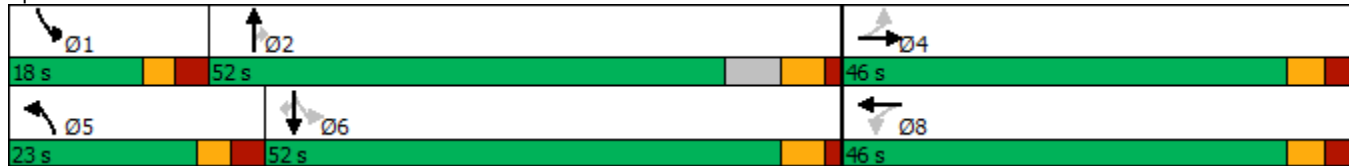


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			D		D	C	A	B	C	A
Approach Delay		27.3			39.7			23.0			18.2	
Approach LOS		C			D			C			B	
Stops (vph)		115			310		26	338	13	99	646	24
Fuel Used(gal)		2			6		1	7	0	3	15	1
CO Emissions (g/hr)		153			400		46	519	34	176	1048	99
NOx Emissions (g/hr)		30			78		9	101	7	34	204	19
VOC Emissions (g/hr)		36			93		11	120	8	41	243	23
Dilemma Vehicles (#)		0			0		0	21	0	0	43	0
Queue Length 50th (ft)		80			206		20	136	0	62	230	0
Queue Length 95th (ft)		165			#416		52	181	29	117	346	52
Internal Link Dist (ft)		413			218			191			389	
Turn Bay Length (ft)							115			140		350
Base Capacity (vph)		608			735		366	2219	1045	457	2003	1028
Starvation Cap Reductn		0			0		0	0	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		0.31			0.57		0.10	0.26	0.14	0.45	0.46	0.30

Intersection Summary

Area Type: Other
 Cycle Length: 121
 Actuated Cycle Length: 87.5
 Natural Cycle: 65
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 23.3
 Intersection LOS: C
 Intersection Capacity Utilization 69.0%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Columbiana Rd & Shades Crest Rd/Vestaview Ln



Lanes, Volumes, Timings
1: Dolly Ridge Rd & Gresham Dr

2019 PM
04/15/2019



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	12	9	0	167	229	7
Future Volume (vph)	12	9	0	167	229	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50	0	100			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.850			0.996	
Fl _t Protected	0.950					
Satd. Flow (prot)	1787	1599	1881	1881	1874	0
Fl _t Permitted	0.950					
Satd. Flow (perm)	1787	1599	1881	1881	1874	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		16			2	
Link Speed (mph)	25			35	35	
Link Distance (ft)	737			474	400	
Travel Time (s)	20.1			9.2	7.8	
Peak Hour Factor	0.58	0.58	0.77	0.77	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	21	16	0	217	241	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	16	0	217	248	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6	6		
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	10.0	20.0	20.0	
Minimum Split (s)	16.0	16.0	14.0	24.5	24.5	
Total Split (s)	34.0	34.0	24.0	39.5	39.5	
Total Split (%)	34.9%	34.9%	24.6%	40.5%	40.5%	
Maximum Green (s)	30.0	30.0	20.0	35.0	35.0	
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	Min	Min	
Act Effct Green (s)	12.2	12.2		35.1	35.1	
Actuated g/C Ratio	0.29	0.29		0.82	0.82	
v/c Ratio	0.04	0.03		0.14	0.16	
Control Delay	12.3	7.0		3.8	3.8	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	12.3	7.0		3.8	3.8	
LOS	B	A		A	A	
Approach Delay	10.0			3.8	3.8	

Lanes, Volumes, Timings
 1: Dolly Ridge Rd & Gresham Dr

2019 PM
 04/15/2019

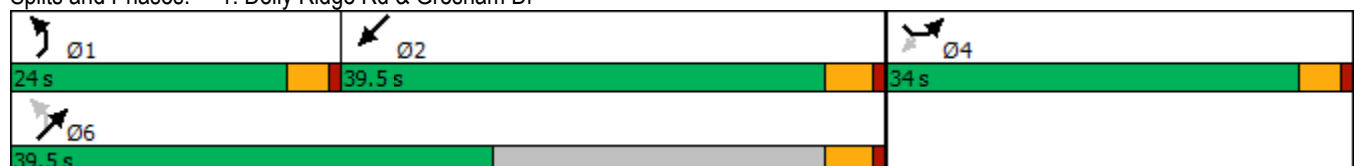


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Approach LOS	B			A	A	
Stops (vph)	11	5		49	69	
Fuel Used(gal)	0	0		1	1	
CO Emissions (g/hr)	10	6		75	97	
NOx Emissions (g/hr)	2	1		15	19	
VOC Emissions (g/hr)	2	1		17	22	
Dilemma Vehicles (#)	0	0		9	13	
Queue Length 50th (ft)	3	0		0	0	
Queue Length 95th (ft)	9	5		42	58	
Internal Link Dist (ft)	657			394	320	
Turn Bay Length (ft)	50					
Base Capacity (vph)	1277	1147		1881	1690	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.02	0.01		0.12	0.15	

Intersection Summary



















Area Type: Other
 Cycle Length: 97.5
 Actuated Cycle Length: 42.6
 Natural Cycle: 55
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.16
 Intersection Signal Delay: 4.3
 Intersection LOS: A
 Intersection Capacity Utilization 33.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: Dolly Ridge Rd & Gresham Dr



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 PM Existing
04/15/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	12	9	102	8	90	16	375	67	109	691	35
Future Volume (vph)	30	12	9	102	8	90	16	375	67	109	691	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.975			0.940			0.977			0.993	
Flt Protected		0.972			0.975		0.950			0.950		
Satd. Flow (prot)	0	1765	0	0	1707	0	1770	1820	0	1770	1850	0
Flt Permitted		0.788			0.808		0.197			0.381		
Satd. Flow (perm)	0	1431	0	0	1415	0	367	1820	0	710	1850	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			52			21			6	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	35	14	11	123	10	108	20	469	84	122	776	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	0	241	0	20	553	0	122	815	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		20.0	20.0		20.0	20.0	
Total Split (s)	25.0	25.0		25.0	25.0		51.0	51.0		51.0	51.0	
Total Split (%)	32.9%	32.9%		32.9%	32.9%		67.1%	67.1%		67.1%	67.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		46.0	46.0		46.0	46.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.2	3.2		3.2	3.2	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)		13.0			13.0		31.2	31.2		31.2	31.2	
Actuated g/C Ratio		0.24			0.24		0.57	0.57		0.57	0.57	
v/c Ratio		0.17			0.64		0.10	0.53		0.30	0.78	
Control Delay		18.3			25.6		7.3	9.4		9.1	15.5	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		18.3			25.6		7.3	9.4		9.1	15.5	
LOS		B			C		A	A		A	B	
Approach Delay		18.3			25.6			9.3			14.7	
Approach LOS		B			C			A			B	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd

2019 PM Existing
 04/15/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		33			131		8	224		49	492	
Fuel Used(gal)		0			3		0	3		1	7	
CO Emissions (g/hr)		31			182		7	202		49	457	
NOx Emissions (g/hr)		6			35		1	39		10	89	
VOC Emissions (g/hr)		7			42		2	47		11	106	
Dilemma Vehicles (#)		0			13		0	0		0	0	
Queue Length 50th (ft)		12			53		3	88		17	169	
Queue Length 95th (ft)		43			133		11	164		53	371	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		571			590		303	1507		586	1529	
Starvation Cap Reductn		0			0		0	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			0.41		0.07	0.37		0.21	0.53	

Intersection Summary

Area Type:	Other
Cycle Length:	76
Actuated Cycle Length:	55.2
Natural Cycle:	45
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.78
Intersection Signal Delay:	14.6
Intersection LOS:	B
Intersection Capacity Utilization	76.8%
ICU Level of Service	D
Analysis Period (min)	15

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Intersection												
Int Delay, s/veh	34.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	90	0	79	0	464	256	184	320	0
Future Vol, veh/h	0	0	0	90	0	79	0	464	256	184	320	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	88	88	88	92	92	92	86	86	86
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	0	0	102	0	90	0	504	278	214	372	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1443	1582	372	1443	1443	643	372	0	0	782	0	0
Stage 1	800	800	-	643	643	-	-	-	-	-	-	-
Stage 2	643	782	-	800	800	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	111	109	676	111	133	475	1192	-	-	840	-	-
Stage 1	380	399	-	464	470	-	-	-	-	-	-	-
Stage 2	464	406	-	380	399	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	68	74	676	~ 83	90	475	1192	-	-	840	-	-
Mov Cap-2 Maneuver	68	74	-	~ 83	90	-	-	-	-	-	-	-
Stage 1	380	271	-	464	470	-	-	-	-	-	-	-
Stage 2	376	406	-	258	271	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	265.6	0	3.9
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1192	-	-	-	140	840	-
HCM Lane V/C Ratio	-	-	-	-	1.372	0.255	-
HCM Control Delay (s)	0	-	-	0	265.6	10.7	0
HCM Lane LOS	A	-	-	A	F	B	A
HCM 95th %tile Q(veh)	0	-	-	-	12.3	1	-

Notes
 ~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
3: US-31 & I-65 NB Ramps & Columbian Rd

2019 PM
03/18/2019

Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	128	307	888	221	746	795	89	1846	37	115	79	795
Future Volume (vph)	128	307	888	221	746	795	89	1846	37	115	79	795
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175	0		400		0	360		230		0	230
Storage Lanes	1	2		2		1	1		1		2	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00	1.00	1.00	0.88
Frt		0.850	0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950	0.950	
Satd. Flow (prot)	1770	1583	1583	3433	3539	1583	1770	3539	1583	1770	1770	2787
Flt Permitted	0.950			0.040			0.297			0.950	0.950	
Satd. Flow (perm)	1770	1583	1583	145	3539	1583	553	3539	1583	1770	1770	2787
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			373			669			56			603
Link Speed (mph)	25			40			40			40		40
Link Distance (ft)	478			683			562			543		543
Travel Time (s)	13.0			11.6			9.6			9.3		9.3
Peak Hour Factor	0.87	0.87	0.87	0.95	0.95	0.95	0.98	0.98	0.98	0.94	0.94	0.94
Adj. Flow (vph)	147	353	1021	233	785	837	91	1884	38	122	84	846
Shared Lane Traffic (%)												
Lane Group Flow (vph)	147	353	1021	233	785	837	91	1884	38	122	84	846
Turn Type	Prot	Perm	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	Prot	Perm
Protected Phases	8			5	2		1	6		4	4	
Permitted Phases		8	8	2		2	6		6			4
Detector Phase	8	8	8	5	2	2	1	6	6	4	4	4
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0	7.0	7.0	7.0
Minimum Split (s)	12.0	12.0	12.0	11.5	25.0	25.0	12.0	25.0	25.0	12.0	12.0	12.0
Total Split (s)	45.0	45.0	45.0	45.0	100.0	100.0	45.0	100.0	100.0	25.0	25.0	25.0
Total Split (%)	20.9%	20.9%	20.9%	20.9%	46.5%	46.5%	20.9%	46.5%	46.5%	11.6%	11.6%	11.6%
Maximum Green (s)	40.0	40.0	40.0	41.0	95.0	95.0	40.5	95.0	95.0	20.5	20.5	20.5
Yellow Time (s)	4.0	4.0	4.0	3.5	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	0.5	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.5	5.0	5.0	4.5	4.5	4.5
Lead/Lag				Lead	Lag	Lag	Lead	Lag	Lag			
Lead-Lag Optimize?				Yes	Yes	Yes	Yes	Yes	Yes			
Vehicle Extension (s)	4.0	4.0	4.0	4.0	5.0	5.0	3.0	5.0	5.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Min	Min	None	Min	Min	None	None	None
Act Effct Green (s)	40.0	40.0	40.0	116.1	101.1	101.1	105.0	95.0	95.0	20.5	20.5	20.5
Actuated g/C Ratio	0.21	0.21	0.21	0.61	0.53	0.53	0.55	0.50	0.50	0.11	0.11	0.11
v/c Ratio	0.40	1.06	1.63	0.64	0.42	0.72	0.25	1.07	0.05	0.64	0.44	1.01
Control Delay	68.8	134.6	315.5	49.7	27.7	9.8	17.4	86.2	2.2	97.8	87.9	55.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	134.6	315.5	49.7	27.7	9.8	17.4	86.2	2.2	97.8	87.9	55.9
LOS	E	F	F	D	C	A	B	F	A	F	F	E
Approach Delay	249.7				22.4			81.5			63.3	
Approach LOS	F				C			F			E	

Lanes, Volumes, Timings
 3: US-31 & I-65 NB Ramps & Columbian Rd

2019 PM
 03/18/2019

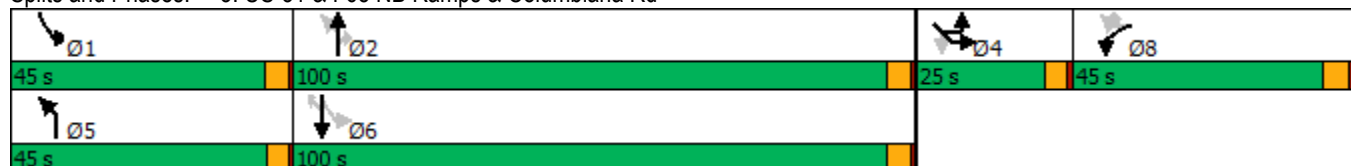


Lane Group	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Stops (vph)	110	265	338	137	436	156	39	1641	2	109	73	217
Fuel Used(gal)	3	11	62	5	12	7	1	56	0	4	2	14
CO Emissions (g/hr)	191	746	4330	322	836	476	73	3883	12	265	169	986
NOx Emissions (g/hr)	37	145	842	63	163	93	14	756	2	51	33	192
VOC Emissions (g/hr)	44	173	1004	75	194	110	17	900	3	61	39	228
Dilemma Vehicles (#)	0	0	0	0	15	0	0	45	0	0	0	0
Queue Length 50th (ft)	161	~483	~1451	94	305	147	46	~1361	0	149	100	~213
Queue Length 95th (ft)	235	#683	#1654	145	368	324	74	#1530	12	232	168	#382
Internal Link Dist (ft)	398				603			482				463
Turn Bay Length (ft)	175			400			360		230			230
Base Capacity (vph)	372	333	627	797	1881	1155	595	1768	819	190	190	838
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	1.06	1.63	0.29	0.42	0.72	0.15	1.07	0.05	0.64	0.44	1.01

Intersection Summary

Area Type: Other
 Cycle Length: 215
 Actuated Cycle Length: 190.1
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.63
 Intersection Signal Delay: 101.2
 Intersection LOS: F
 Intersection Capacity Utilization 88.0%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: US-31 & I-65 NB Ramps & Columbian Rd



Lanes, Volumes, Timings
1: US-31 & Shades Crest Rd

2019 PM
03/18/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↗	↘		↗	↕	↘	↗	↕	↘
Traffic Volume (vph)	67	84	40	158	74	72	35	991	186	253	2073	330
Future Volume (vph)	67	84	40	158	74	72	35	991	186	253	2073	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	35		0	300		175	0		375
Storage Lanes	0		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.972			0.926				0.850			0.850
Flt Protected		0.983		0.950			0.950			0.950		
Satd. Flow (prot)	0	1780	0	1770	1725	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.581		0.439			0.031			0.187		
Satd. Flow (perm)	0	1052	0	818	1725	0	58	3539	1583	348	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			22				147			194
Link Speed (mph)		30			30			45				45
Link Distance (ft)		482			504			393				502
Travel Time (s)		11.0			11.5			6.0				7.6
Peak Hour Factor	0.71	0.71	0.71	0.88	0.88	0.88	0.87	0.87	0.87	0.92	0.92	0.92
Adj. Flow (vph)	94	118	56	180	84	82	40	1139	214	275	2253	359
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	268	0	180	166	0	40	1139	214	275	2253	359
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1		6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	29.5	29.5		29.5	29.5		12.0	25.0	25.0	12.0	25.0	25.0
Total Split (s)	45.0	45.0		45.0	45.0		40.0	135.0	135.0	20.0	115.0	115.0
Total Split (%)	22.5%	22.5%		22.5%	22.5%		20.0%	67.5%	67.5%	10.0%	57.5%	57.5%
Maximum Green (s)	40.5	40.5		40.5	40.5		35.5	130.0	130.0	15.5	110.0	110.0
Yellow Time (s)	3.5	3.5		3.5	3.5		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		0.5	1.0	1.0	0.5	1.0	1.0
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5		4.5	4.5		4.5	5.0	5.0	4.5	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0							
Flash Dont Walk (s)	18.0	18.0		18.0	18.0							
Pedestrian Calls (#/hr)	0	0		0	0							
Act Effct Green (s)		40.5		40.5	40.5		139.4	130.9	130.9	150.5	139.9	139.9
Actuated g/C Ratio		0.20		0.20	0.20		0.70	0.65	0.65	0.75	0.70	0.70
v/c Ratio		1.24		1.09	0.45		0.37	0.49	0.20	0.75	0.91	0.31
Control Delay		198.2		165.5	64.9		27.3	18.6	4.7	21.8	32.4	5.9
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		198.2		165.5	64.9		27.3	18.6	4.7	21.8	32.4	5.9

Lanes, Volumes, Timings
 1: US-31 & Shades Crest Rd

2019 PM
 03/18/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F		F	E		C	B	A	C	C	A
Approach Delay		198.2			117.3			16.7			28.1	
Approach LOS		F			F			B			C	
Stops (vph)		148		130	110		11	489	23	75	1643	56
Fuel Used(gal)		9		7	3		0	12	1	3	41	2
CO Emissions (g/hr)		643		466	218		29	864	66	201	2857	151
NOx Emissions (g/hr)		125		91	42		6	168	13	39	556	29
VOC Emissions (g/hr)		149		108	50		7	200	15	47	662	35
Dilemma Vehicles (#)		0		0	0		0	25	0	0	51	0
Queue Length 50th (ft)		~428		~265	169		12	393	31	98	1271	73
Queue Length 95th (ft)		#436		#431	248		43	423	62	137	1448	128
Internal Link Dist (ft)		402			424			313			422	
Turn Bay Length (ft)				35			300		175			375
Base Capacity (vph)		217		165	366		347	2317	1087	372	2475	1165
Starvation Cap Reductn		0		0	0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0		0	0	0	0	0	0
Reduced v/c Ratio		1.24		1.09	0.45		0.12	0.49	0.20	0.74	0.91	0.31

Intersection Summary




















Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 188 (94%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.24
 Intersection Signal Delay: 40.5
 Intersection LOS: D
 Intersection Capacity Utilization 97.9%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: US-31 & Shades Crest Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & US-280

2019 PM
03/18/2019

						
Lane Group	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations	 	  	  		  	
Traffic Volume (vph)	309	2834	4637	668	324	265
Future Volume (vph)	309	2834	4637	668	324	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350			0	100	100
Storage Lanes	2			1	1	1
Taper Length (ft)	75				75	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.94	1.00
Fr't				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	5085	5085	1583	4990	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	5085	5085	1583	4990	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				180		202
Link Speed (mph)		55	55		40	
Link Distance (ft)		616	491		414	
Travel Time (s)		7.6	6.1		7.1	
Peak Hour Factor	0.98	0.98	0.93	0.93	0.80	0.80
Adj. Flow (vph)	315	2892	4986	718	405	331
Shared Lane Traffic (%)						
Lane Group Flow (vph)	315	2892	4986	718	405	331
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	12.0	12.0	12.0	8.0	8.0
Minimum Split (s)	12.5	24.5	24.5	24.5	22.5	22.5
Total Split (s)	40.0	200.0	160.0	160.0	40.0	40.0
Total Split (%)	16.7%	83.3%	66.7%	66.7%	16.7%	16.7%
Maximum Green (s)	35.5	193.5	153.5	153.5	35.5	35.5
Yellow Time (s)	3.5	5.5	5.5	5.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	6.5	6.5	6.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	26.5	193.7	162.6	162.6	27.6	27.6
Actuated g/C Ratio	0.11	0.83	0.70	0.70	0.12	0.12
v/c Ratio	0.80	0.68	1.40	0.62	0.68	0.90
Control Delay	116.4	9.0	212.0	16.9	104.0	66.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.7
Total Delay	116.4	9.0	212.0	16.9	104.0	67.3

Lanes, Volumes, Timings
1: Rocky Ridge Rd & US-280

2019 PM
03/18/2019



Lane Group	NBL	NBT	SBT	SBR	NEL	NER
LOS	F	A	F	B	F	E
Approach Delay		19.6	187.5		87.5	
Approach LOS		B	F		F	
Stops (vph)	298	1047	3335	276	305	110
Fuel Used(gal)	14	36	277	10	11	5
CO Emissions (g/hr)	983	2496	19331	664	753	379
NOx Emissions (g/hr)	191	486	3761	129	146	74
VOC Emissions (g/hr)	228	579	4480	154	174	88
Dilemma Vehicles (#)	0	61	22	0	0	0
Queue Length 50th (ft)	247	554	~3718	421	215	214
Queue Length 95th (ft)	311	703	#3894	667	227	267
Internal Link Dist (ft)		536	411		334	
Turn Bay Length (ft)	350				100	100
Base Capacity (vph)	524	4238	3559	1162	763	413
Starvation Cap Reductn	0	0	0	0	0	9
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.68	1.40	0.62	0.53	0.82

Intersection Summary

Area Type: Other
 Cycle Length: 240
 Actuated Cycle Length: 232.3
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.40
 Intersection Signal Delay: 124.0
 Intersection LOS: F
 Intersection Capacity Utilization 118.0%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & US-280



Lanes, Volumes, Timings
2: Rocky Ridge Rd & Shades Crest Rd

2019 PM
03/18/2019



Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	264	19	17	325	693	284
Future Volume (vph)	264	19	17	325	693	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	100	125			0
Storage Lanes	1	1	1			1
Taper Length (ft)	75		75			
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Fr _t		0.850				0.850
Fl _t Protected	0.950			0.997		
Satd. Flow (prot)	1770	1583	0	3529	1863	1583
Fl _t Permitted	0.950			0.894		
Satd. Flow (perm)	1770	1583	0	3164	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		21				305
Link Speed (mph)	25			40	40	
Link Distance (ft)	484			376	414	
Travel Time (s)	13.2			6.4	7.1	
Peak Hour Factor	0.90	0.90	0.87	0.87	0.93	0.93
Adj. Flow (vph)	293	21	20	374	745	305
Shared Lane Traffic (%)						
Lane Group Flow (vph)	293	21	0	394	745	305
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases		4	6			2
Detector Phase	4	4	6	6	2	2
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	12.0	12.0	12.0
Minimum Split (s)	22.5	22.5	23.0	23.0	23.0	23.0
Total Split (s)	32.0	32.0	45.0	45.0	45.0	45.0
Total Split (%)	41.6%	41.6%	58.4%	58.4%	58.4%	58.4%
Maximum Green (s)	27.7	27.7	40.0	40.0	40.0	40.0
Yellow Time (s)	3.1	3.1	3.8	3.8	3.8	3.8
All-Red Time (s)	1.2	1.2	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.3	4.3		5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	27.7	27.7		40.0	40.0	40.0
Actuated g/C Ratio	0.36	0.36		0.52	0.52	0.52
v/c Ratio	0.46	0.04		0.24	0.77	0.32
Control Delay	21.8	7.4		10.6	21.6	2.2
Queue Delay	0.0	0.0		0.0	10.4	0.0
Total Delay	21.8	7.4		10.6	32.0	2.2

Lanes, Volumes, Timings
 2: Rocky Ridge Rd & Shades Crest Rd

2019 PM
 03/18/2019

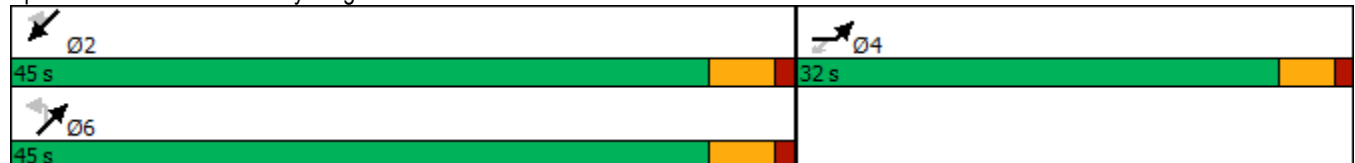


Lane Group	EBL	EBR	NEL	NET	SWT	SWR
LOS	C	A		B	C	A
Approach Delay	20.9			10.6	23.4	
Approach LOS	C			B	C	
Stops (vph)	196	6		176	536	21
Fuel Used(gal)	3	0		3	10	1
CO Emissions (g/hr)	211	9		234	717	79
NOx Emissions (g/hr)	41	2		46	140	15
VOC Emissions (g/hr)	49	2		54	166	18
Dilemma Vehicles (#)	0	0		22	45	0
Queue Length 50th (ft)	106	0		51	267	0
Queue Length 95th (ft)	175	14		73	415	35
Internal Link Dist (ft)	404			296	334	
Turn Bay Length (ft)		100				
Base Capacity (vph)	636	582		1643	967	968
Starvation Cap Reductn	0	0		0	200	0
Spillback Cap Reductn	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.46	0.04		0.24	0.97	0.32

Intersection Summary

Area Type: Other
 Cycle Length: 77
 Actuated Cycle Length: 77
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 20.1
 Intersection LOS: C
 Intersection Capacity Utilization 58.8%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 2: Rocky Ridge Rd & Shades Crest Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 School PM Existing
04/15/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Volume (vph)	26	11	15	82	11	86	14	314	55	92	500	35
Future Volume (vph)	26	11	15	82	11	86	14	314	55	92	500	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960			0.935			0.977			0.990	
Flt Protected		0.976			0.978		0.950			0.950		
Satd. Flow (prot)	0	1745	0	0	1703	0	1770	1820	0	1770	1844	0
Flt Permitted		0.849			0.822		0.293			0.499		
Satd. Flow (perm)	0	1518	0	0	1432	0	546	1820	0	930	1844	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			59			22			9	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.88	0.88	0.88	0.77	0.77	0.77
Adj. Flow (vph)	34	14	20	93	13	98	16	357	63	119	649	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	68	0	0	204	0	16	420	0	119	694	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	24.0	24.0		24.0	24.0		52.0	52.0		52.0	52.0	
Total Split (%)	31.6%	31.6%		31.6%	31.6%		68.4%	68.4%		68.4%	68.4%	
Maximum Green (s)	20.0	20.0		20.0	20.0		46.9	46.9		46.9	46.9	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	0.0	0.0		0.0	0.0		1.1	1.1		1.1	1.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		5.1	5.1		5.1	5.1	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.2	3.2		3.2	3.2	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)		10.8			10.8		27.5	27.5		27.5	27.5	
Actuated g/C Ratio		0.22			0.22		0.57	0.57		0.57	0.57	
v/c Ratio		0.19			0.55		0.05	0.40		0.22	0.66	
Control Delay		14.5			19.3		5.6	7.0		6.8	10.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		14.5			19.3		5.6	7.0		6.8	10.8	
LOS		B			B		A	A		A	B	
Approach Delay		14.5			19.3			6.9			10.2	
Approach LOS		B			B			A			B	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd

2019 School PM Existing
 04/15/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		30			105		7	167		39	319	
Fuel Used(gal)		0			2		0	2		1	4	
CO Emissions (g/hr)		27			141		6	148		38	284	
NOx Emissions (g/hr)		5			27		1	29		7	55	
VOC Emissions (g/hr)		6			33		1	34		9	66	
Dilemma Vehicles (#)		0			13		0	0		0	0	
Queue Length 50th (ft)		9			29		2	45		12	97	
Queue Length 95th (ft)		37			109		9	122		36	197	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		683			667		500	1669		852	1690	
Starvation Cap Reductn		0			0		0	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		0.10			0.31		0.03	0.25		0.14	0.41	

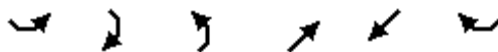
Intersection Summary

Area Type:	Other
Cycle Length:	76
Actuated Cycle Length:	48
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.66
Intersection Signal Delay:	10.7
Intersection LOS:	B
Intersection Capacity Utilization	65.4%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
1: Dolly Ridge Rd & Gresham Dr



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	75	298	205	154	149	107
Future Volume (vph)	75	298	205	154	149	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50	0	100			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.948	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1787	1599	1787	1881	1783	0
Flt Permitted	0.950		0.478			
Satd. Flow (perm)	1787	1599	899	1881	1783	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		608			36	
Link Speed (mph)	25			35	35	
Link Distance (ft)	737			474	400	
Travel Time (s)	20.1			9.2	7.8	
Peak Hour Factor	0.49	0.49	0.94	0.83	0.82	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	153	608	218	186	182	114
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	608	218	186	296	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6	6		
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	10.0	20.0	20.0	
Minimum Split (s)	16.5	16.5	14.5	24.5	24.5	
Total Split (s)	34.0	34.0	24.0	39.5	39.5	
Total Split (%)	34.9%	34.9%	24.6%	40.5%	40.5%	
Maximum Green (s)	30.0	30.0	20.0	35.0	35.0	
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	Max	Max	
Walk Time (s)					7.0	
Flash Dont Walk (s)					11.0	
Pedestrian Calls (#/hr)					0	
Act Effct Green (s)	14.4	14.4	50.2	49.7	35.2	
Actuated g/C Ratio	0.20	0.20	0.69	0.68	0.48	
v/c Ratio	0.43	0.76	0.29	0.14	0.34	
Control Delay	29.5	9.3	5.6	4.9	12.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	

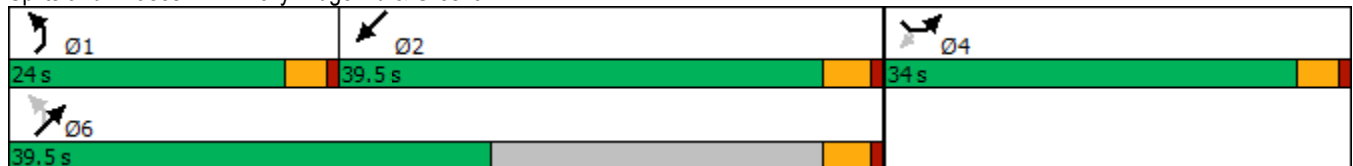


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Total Delay	29.5	9.3	5.6	4.9	12.3	
LOS	C	A	A	A	B	
Approach Delay	13.3			5.3	12.3	
Approach LOS	B			A	B	
Stops (vph)	61	34	67	50	133	
Fuel Used(gal)	1	3	1	1	2	
CO Emissions (g/hr)	81	179	101	74	166	
NOx Emissions (g/hr)	16	35	20	14	32	
VOC Emissions (g/hr)	19	42	23	17	39	
Dilemma Vehicles (#)	0	0	0	8	17	
Queue Length 50th (ft)	60	0	24	21	61	
Queue Length 95th (ft)	58	0	73	57	133	
Internal Link Dist (ft)	657			394	320	
Turn Bay Length (ft)	50		100			
Base Capacity (vph)	741	1019	867	1535	881	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.21	0.60	0.25	0.12	0.34	

Intersection Summary

Area Type:	Other
Cycle Length:	97.5
Actuated Cycle Length:	72.6
Natural Cycle:	60
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.76
Intersection Signal Delay:	10.9
Intersection LOS:	B
Intersection Capacity Utilization	48.4%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 1: Dolly Ridge Rd & Gresham Dr



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 School PM Existing with Trip Gen
04/15/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Volume (vph)	26	27	15	221	30	231	14	314	137	229	500	35
Future Volume (vph)	26	27	15	221	30	231	14	314	137	229	500	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970			0.935			0.954			0.990	
Flt Protected		0.981			0.978		0.950			0.950		
Satd. Flow (prot)	0	1773	0	0	1703	0	1770	1777	0	1770	1844	0
Flt Permitted		0.786			0.810		0.220			0.366		
Satd. Flow (perm)	0	1420	0	0	1411	0	410	1777	0	682	1844	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			59			52			8	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.88	0.88	0.88	0.77	0.77	0.77
Adj. Flow (vph)	34	36	20	251	34	263	16	357	156	297	649	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	90	0	0	548	0	16	513	0	297	694	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		6	6		2	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		20.0	20.0		20.0	20.0	
Total Split (s)	25.0	25.0		25.0	25.0		51.0	51.0		51.0	51.0	
Total Split (%)	32.9%	32.9%		32.9%	32.9%		67.1%	67.1%		67.1%	67.1%	
Maximum Green (s)	20.0	20.0		20.0	20.0		46.0	46.0		46.0	46.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.2	3.2		3.2	3.2	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)		20.6			20.6		31.4	31.4		31.4	31.4	
Actuated g/C Ratio		0.33			0.33		0.50	0.50		0.50	0.50	
v/c Ratio		0.19			1.08		0.08	0.56		0.87	0.74	
Control Delay		17.4			89.5		7.6	11.2		38.8	16.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		17.4			89.5		7.6	11.2		38.8	16.9	
LOS		B			F		A	B		D	B	
Approach Delay		17.4			89.5			11.1			23.4	
Approach LOS		B			F			B			C	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		42			305		7	237		177	365	
Fuel Used(gal)		1			12		0	3		3	5	
CO Emissions (g/hr)		39			872		6	221		229	348	
NOx Emissions (g/hr)		8			170		1	43		44	68	
VOC Emissions (g/hr)		9			202		1	51		53	81	
Dilemma Vehicles (#)		0			30		0	0		0	0	
Queue Length 50th (ft)		19			~226		3	105		88	183	
Queue Length 95th (ft)		51			#493		10	165		143	215	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		481			506		312	1365		519	1405	
Starvation Cap Reductn		0			0		0	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		0.19			1.08		0.05	0.38		0.57	0.49	

Intersection Summary

Area Type:	Other
Cycle Length:	76
Actuated Cycle Length:	62.3
Natural Cycle:	65
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.08
Intersection Signal Delay:	37.0
Intersection LOS:	D
Intersection Capacity Utilization:	88.1%
ICU Level of Service:	E
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
3: Columbiana Rd & Shades Crest Rd/Vestaview Ln

2019 AM Improved
03/20/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕	↗	↗	↗	↕
Traffic Volume (vph)	184	109	20	57	34	112	16	1256	226	118	255	31
Future Volume (vph)	184	109	20	57	34	112	16	1256	226	118	255	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	115		0	140		350
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.991			0.925				0.850			0.850
Flt Protected		0.971			0.986		0.950			0.950		
Satd. Flow (prot)	0	1792	0	0	1699	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.638			0.825		0.950			0.071		
Satd. Flow (perm)	0	1178	0	0	1422	0	1770	3539	1583	132	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			55				207			89
Link Speed (mph)		30			30			45				45
Link Distance (ft)		493			298			271				469
Travel Time (s)		11.2			6.8			4.1				7.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	200	118	22	62	37	122	17	1365	246	128	277	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	340	0	0	221	0	17	1365	246	128	277	34
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	18.0	18.0	5.0	18.0	18.0
Minimum Split (s)	24.0	24.0		24.0	24.0		12.0	23.5	23.5	24.0	23.5	23.5
Total Split (s)	36.0	36.0		36.0	36.0		12.0	50.0	50.0	24.0	62.0	62.0
Total Split (%)	32.7%	32.7%		32.7%	32.7%		10.9%	45.5%	45.5%	21.8%	56.4%	56.4%
Maximum Green (s)	30.0	30.0		30.0	30.0		6.0	44.5	44.5	18.0	56.5	56.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.5	2.5		2.5	2.5		3.0	1.5	1.5	3.0	1.5	1.5
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0			6.0		6.0	5.5	5.5	6.0	5.5	5.5
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.5	3.5	2.0	3.5	3.5
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	10.0	10.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		30.7			30.7		5.5	53.3	53.3	66.8	63.0	63.0
Actuated g/C Ratio		0.28			0.28		0.05	0.48	0.48	0.61	0.57	0.57
v/c Ratio		1.03			0.51		0.19	0.80	0.28	0.62	0.14	0.04
Control Delay		97.1			29.7		55.1	28.5	4.7	31.5	10.5	0.5
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		97.1			29.7		55.1	28.5	4.7	31.5	10.5	0.5

Lanes, Volumes, Timings
 3: Columbiana Rd & Shades Crest Rd/Vestaview Ln

2019 AM Improved
 03/20/2019

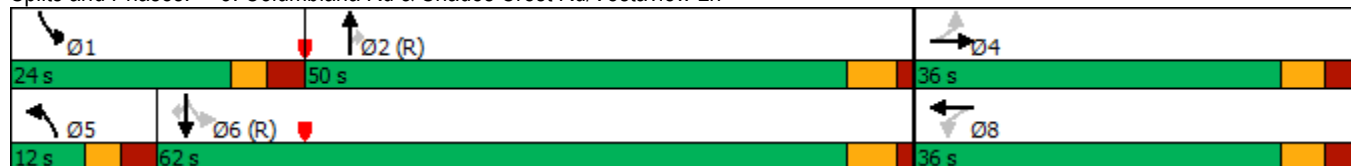


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F			C		E	C	A	C	B	A
Approach Delay		97.1			29.7			25.2			15.9	
Approach LOS		F			C			C			B	
Stops (vph)		257			129		17	1016	29	59	114	1
Fuel Used(gal)		9			2		0	22	1	2	3	0
CO Emissions (g/hr)		616			169		29	1547	68	129	192	8
NOx Emissions (g/hr)		120			33		6	301	13	25	37	1
VOC Emissions (g/hr)		143			39		7	359	16	30	44	2
Dilemma Vehicles (#)		0			0		0	57	0	0	10	0
Queue Length 50th (ft)		~261			98		12	400	14	41	46	0
Queue Length 95th (ft)		#446			177		35	541	62	106	63	0
Internal Link Dist (ft)		413			218			191			389	
Turn Bay Length (ft)							115			140		350
Base Capacity (vph)		331			436		96	1714	873	348	2026	944
Starvation Cap Reductn		0			0		0	0	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		1.03			0.51		0.18	0.80	0.28	0.37	0.14	0.04

Intersection Summary












Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 33.3
 Intersection LOS: C
 Intersection Capacity Utilization 89.1%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Columbiana Rd & Shades Crest Rd/Vestaview Ln



Lanes, Volumes, Timings
6: Columbiana Rd & Shades Crest Rd

2019 AM Improved
03/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	58	74	1210	342	79	346
Future Volume (vph)	58	74	1210	342	79	346
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		160	150	
Storage Lanes	1	0		1	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	0.924			0.850		
Flt Protected	0.978				0.950	
Satd. Flow (prot)	1683	0	3539	1583	1770	3539
Flt Permitted	0.978				0.158	
Satd. Flow (perm)	1683	0	3539	1583	294	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	52			329		
Link Speed (mph)	30		45			45
Link Distance (ft)	299		469			333
Travel Time (s)	6.8		7.1			5.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	80	1315	372	86	376
Shared Lane Traffic (%)						
Lane Group Flow (vph)	143	0	1315	372	86	376
Turn Type	Prot		NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases				2	6	
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		18.0	18.0	5.0	18.0
Minimum Split (s)	22.5		22.5	22.5	9.5	22.5
Total Split (s)	26.0		71.0	71.0	13.0	84.0
Total Split (%)	23.6%		64.5%	64.5%	11.8%	76.4%
Maximum Green (s)	21.5		66.5	66.5	8.5	79.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	5.0		3.0	3.0	3.0	3.0
Recall Mode	None		C-Min	C-Min	None	C-Min
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			11.0	11.0		11.0
Pedestrian Calls (#/hr)			0	0		0
Act Effct Green (s)	13.3		78.5	78.5	87.7	87.7
Actuated g/C Ratio	0.12		0.71	0.71	0.80	0.80
v/c Ratio	0.57		0.52	0.30	0.27	0.13
Control Delay	37.1		4.0	0.4	5.0	3.0
Queue Delay	0.0		0.2	0.3	0.0	0.0
Total Delay	37.1		4.2	0.7	5.0	3.0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D		A	A	A	A
Approach Delay	37.1		3.4			3.4
Approach LOS	D		A			A
Stops (vph)	78		258	1	17	74
Fuel Used(gal)	2		8	1	0	2
CO Emissions (g/hr)	121		550	76	32	131
NOx Emissions (g/hr)	24		107	15	6	26
VOC Emissions (g/hr)	28		128	18	7	30
Dilemma Vehicles (#)	0		40	0	0	16
Queue Length 50th (ft)	61		94	0	10	25
Queue Length 95th (ft)	119		m42	m0	26	46
Internal Link Dist (ft)	219		389			253
Turn Bay Length (ft)				160	150	
Base Capacity (vph)	370		2524	1223	348	2820
Starvation Cap Reductn	0		437	358	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.39		0.63	0.43	0.25	0.13

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 15 (14%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 5.5
 Intersection LOS: A
 Intersection Capacity Utilization 56.8%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Columbiana Rd & Shades Crest Rd



Lanes, Volumes, Timings
1: Dolly Ridge Rd & Gresham Dr

2019 AM Improved
04/15/2019



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	190	371	635	258	143	56
Future Volume (vph)	190	371	635	258	143	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	300			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.850			0.951	
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	1787	1599	1787	1881	1789	0
Fl _t Permitted	0.950		0.263			
Satd. Flow (perm)	1787	1599	495	1881	1789	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		640			26	
Link Speed (mph)	25			35	35	
Link Distance (ft)	737			474	400	
Travel Time (s)	20.1			9.2	7.8	
Peak Hour Factor	0.58	0.58	0.57	0.83	0.82	0.57
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	328	640	1114	311	174	98
Shared Lane Traffic (%)						
Lane Group Flow (vph)	328	640	1114	311	272	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	12.0	12.0	10.0	20.0	20.0	
Minimum Split (s)	16.0	16.0	14.0	24.5	24.5	
Total Split (s)	22.5	22.5	52.0	77.5	25.5	
Total Split (%)	22.5%	22.5%	52.0%	77.5%	25.5%	
Maximum Green (s)	18.5	18.5	48.0	73.0	21.0	
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	3.0	3.2	3.2	
Recall Mode	None	None	None	Min	Min	
Act Effct Green (s)	18.5	18.5	72.9	72.4	20.4	
Actuated g/C Ratio	0.19	0.19	0.73	0.73	0.21	
v/c Ratio	0.99	0.78	1.13	0.23	0.70	
Control Delay	88.6	10.8	91.8	4.9	43.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	88.6	10.8	91.8	4.9	43.9	
LOS	F	B	F	A	D	
Approach Delay	37.2			72.8	43.9	

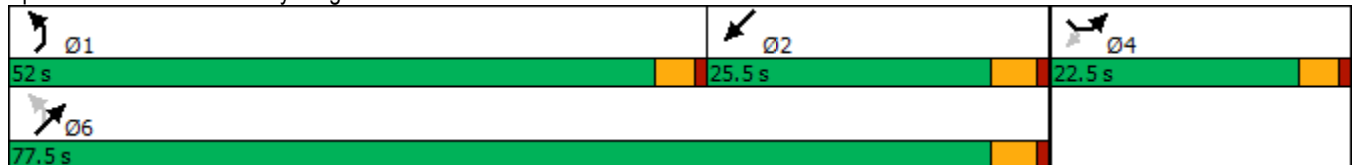


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Approach LOS	D		E			D
Stops (vph)	163	39	449	75	165	
Fuel Used(gal)	5	3	17	2	4	
CO Emissions (g/hr)	367	231	1217	119	251	
NOx Emissions (g/hr)	71	45	237	23	49	
VOC Emissions (g/hr)	85	53	282	28	58	
Dilemma Vehicles (#)	0	0	0	9	9	
Queue Length 50th (ft)	208	0	~737	54	146	
Queue Length 95th (ft)	184	0	325	75	208	
Internal Link Dist (ft)	657		394			320
Turn Bay Length (ft)	300					
Base Capacity (vph)	332	818	986	1381	398	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.99	0.78	1.13	0.23	0.68	

Intersection Summary























Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 99.4
 Natural Cycle: 140
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.13
 Intersection Signal Delay: 56.9
 Intersection LOS: E
 Intersection Capacity Utilization 72.8%
 ICU Level of Service C
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Dolly Ridge Rd & Gresham Dr



Lanes, Volumes, Timings
1: US-31 & Shades Crest Rd

2019 AM Improved
04/23/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	313	48	14	155	61	270	30	2032	114	46	726	35
Future Volume (vph)	313	48	14	155	61	270	30	2032	114	46	726	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	250		0	300		175	0		375
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.966			0.878				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1799	0	1770	1635	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.140			0.697			0.950			0.030		
Satd. Flow (perm)	261	1799	0	1298	1635	0	1770	3539	1583	56	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			87				55			55
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		482			504			393			502	
Travel Time (s)		11.0			11.5			6.0			7.6	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.96	0.96	0.96	0.82	0.82	0.82
Adj. Flow (vph)	382	59	17	189	74	329	31	2117	119	56	885	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	382	76	0	189	403	0	31	2117	119	56	885	43
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8					2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	12.0	29.5		12.0	29.5		12.0	25.0	25.0	12.0	25.0	25.0
Total Split (s)	30.0	30.0		30.0	30.0		20.0	130.0	130.0	20.0	130.0	130.0
Total Split (%)	14.3%	14.3%		14.3%	14.3%		9.5%	61.9%	61.9%	9.5%	61.9%	61.9%
Maximum Green (s)	25.5	25.5		25.5	25.5		15.5	125.0	125.0	15.5	125.0	125.0
Yellow Time (s)	3.5	3.5		3.5	3.5		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		0.5	1.0	1.0	0.5	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	5.0	5.0	4.5	5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)		7.0			7.0							
Flash Dont Walk (s)		18.0			18.0							
Pedestrian Calls (#/hr)		0			0							
Act Effct Green (s)	53.1	28.6		47.9	25.5		10.2	131.0	131.0	141.2	132.6	132.6
Actuated g/C Ratio	0.25	0.14		0.23	0.12		0.05	0.62	0.62	0.67	0.63	0.63
v/c Ratio	1.53	0.30		0.55	1.47		0.36	0.96	0.12	0.49	0.40	0.04
Control Delay	302.5	80.1		70.5	272.8		107.6	48.6	9.0	44.7	20.2	2.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	302.5	80.1		70.5	272.8		107.6	48.6	9.0	44.7	20.2	2.0

Lanes, Volumes, Timings
1: US-31 & Shades Crest Rd

2019 AM Improved
04/23/2019

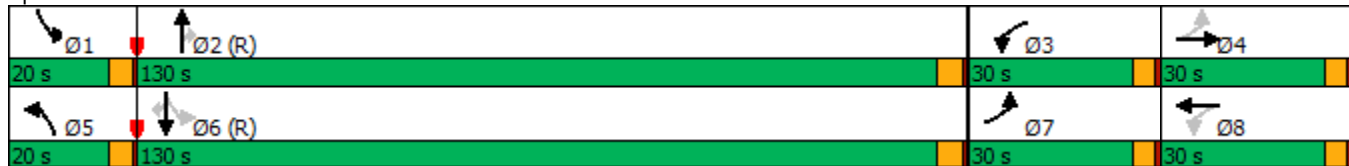


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	F		E	F		F	D	A	D	C	A
Approach Delay		265.6			208.2			47.3			20.8	
Approach LOS		F			F			D			C	
Stops (vph)	192	51		130	176		29	1757	24	22	349	2
Fuel Used(gal)	22	2		4	21		1	47	1	1	10	0
CO Emissions (g/hr)	1504	107		248	1440		76	3295	56	59	678	11
NOx Emissions (g/hr)	293	21		48	280		15	641	11	11	132	2
VOC Emissions (g/hr)	348	25		58	334		18	764	13	14	157	2
Dilemma Vehicles (#)	0	0		0	0		0	47	0	0	17	0
Queue Length 50th (ft)	~692	90		218	~652		43	1391	33	26	317	0
Queue Length 95th (ft)	#813	138		275	#768		85	#1681	69	70	336	9
Internal Link Dist (ft)		402			424			313			422	
Turn Bay Length (ft)	250			250			300		175			375
Base Capacity (vph)	249	250		372	274		130	2207	1008	165	2234	1020
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	1.53	0.30		0.51	1.47		0.24	0.96	0.12	0.34	0.40	0.04

Intersection Summary




















Area Type: Other
 Cycle Length: 210
 Actuated Cycle Length: 210
 Offset: 51 (24%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.53
 Intersection Signal Delay: 86.6
 Intersection LOS: F
 Intersection Capacity Utilization 105.0%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: US-31 & Shades Crest Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & US-280

2019 AM Improved
03/18/2019

						
Lane Group	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations	 	  	  		  	
Traffic Volume (vph)	274	3867	3020	191	448	159
Future Volume (vph)	274	3867	3020	191	448	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350			0	100	100
Storage Lanes	2			1	0	0
Taper Length (ft)	75				75	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.94	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	5085	5085	1583	4990	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	5085	5085	1583	4990	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				79		173
Link Speed (mph)		55	55		40	
Link Distance (ft)		616	491		414	
Travel Time (s)		7.6	6.1		7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	298	4203	3283	208	487	173
Shared Lane Traffic (%)						
Lane Group Flow (vph)	298	4203	3283	208	487	173
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	12.0	12.0	12.0	8.0	8.0
Minimum Split (s)	12.5	24.5	24.5	24.5	22.5	22.5
Total Split (s)	40.0	200.0	160.0	160.0	40.0	40.0
Total Split (%)	16.7%	83.3%	66.7%	66.7%	16.7%	16.7%
Maximum Green (s)	35.5	193.5	153.5	153.5	35.5	35.5
Yellow Time (s)	3.5	5.5	5.5	5.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	6.5	6.5	6.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	25.4	193.5	163.6	163.6	28.1	28.1
Actuated g/C Ratio	0.11	0.83	0.70	0.70	0.12	0.12
v/c Ratio	0.79	0.99	0.92	0.18	0.81	0.50
Control Delay	116.8	31.0	34.8	8.2	110.8	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.1
Total Delay	116.8	31.0	34.8	8.2	111.1	15.1



Lane Group	NBL	NBT	SBT	SBR	NEL	NER
LOS	F	C	C	A	F	B
Approach Delay		36.7	33.3		85.9	
Approach LOS		D	C		F	
Stops (vph)	263	3074	2378	40	431	16
Fuel Used(gal)	12	97	75	2	16	1
CO Emissions (g/hr)	872	6753	5242	116	1091	76
NOx Emissions (g/hr)	170	1314	1020	23	212	15
VOC Emissions (g/hr)	202	1565	1215	27	253	18
Dilemma Vehicles (#)	0	81	19	0	0	0
Queue Length 50th (ft)	234	2025	1478	61	263	0
Queue Length 95th (ft)	295	#2509	1793	118	311	85
Internal Link Dist (ft)		536	411		334	
Turn Bay Length (ft)	350				100	100
Base Capacity (vph)	524	4231	3577	1136	761	388
Starvation Cap Reductn	0	0	0	0	39	9
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.99	0.92	0.18	0.67	0.46

Intersection Summary

Area Type: Other
 Cycle Length: 240
 Actuated Cycle Length: 232.6
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 39.1
 Intersection LOS: D
 Intersection Capacity Utilization 92.4%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & US-280



Lanes, Volumes, Timings
2: Rocky Ridge Rd & Shades Crest Rd

2019 AM Improved
03/18/2019



Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	151	22	7	456	294	171
Future Volume (vph)	151	22	7	456	294	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	100	125			0
Storage Lanes	1	1	1			1
Taper Length (ft)	75		75			
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Fr _t		0.850				0.850
Fl _t Protected	0.950			0.999		
Satd. Flow (prot)	1770	1583	0	3536	1863	1583
Fl _t Permitted	0.950			0.950		
Satd. Flow (perm)	1770	1583	0	3362	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		24				186
Link Speed (mph)	25			40	40	
Link Distance (ft)	484			376	414	
Travel Time (s)	13.2			6.4	7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	164	24	8	496	320	186
Shared Lane Traffic (%)						
Lane Group Flow (vph)	164	24	0	504	320	186
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases		4	6			2
Detector Phase	4	4	6	6	2	2
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	12.0	12.0	12.0
Minimum Split (s)	22.5	22.5	23.0	23.0	23.0	23.0
Total Split (s)	33.0	33.0	44.0	44.0	44.0	44.0
Total Split (%)	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Maximum Green (s)	28.7	28.7	39.0	39.0	39.0	39.0
Yellow Time (s)	3.1	3.1	3.8	3.8	3.8	3.8
All-Red Time (s)	1.2	1.2	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.3	4.3		5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	28.7	28.7		39.0	39.0	39.0
Actuated g/C Ratio	0.37	0.37		0.51	0.51	0.51
v/c Ratio	0.25	0.04		0.30	0.34	0.21
Control Delay	18.0	6.9		11.6	12.6	2.4
Queue Delay	0.0	0.0		0.0	0.0	0.0
Total Delay	18.0	6.9		11.6	12.6	2.4

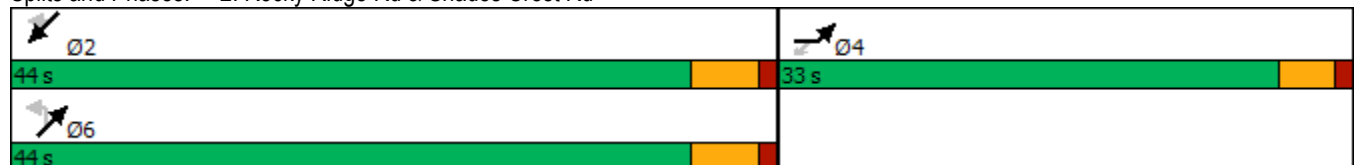


Lane Group	EBL	EBR	NEL	NET	SWT	SWR
LOS	B	A		B	B	A
Approach Delay	16.6			11.6	8.8	
Approach LOS	B			B	A	
Stops (vph)	100	6		253	165	16
Fuel Used(gal)	2	0		5	3	1
CO Emissions (g/hr)	109	10		333	224	50
NOx Emissions (g/hr)	21	2		65	44	10
VOC Emissions (g/hr)	25	2		77	52	12
Dilemma Vehicles (#)	0	0		30	19	0
Queue Length 50th (ft)	53	0		69	86	0
Queue Length 95th (ft)	96	14		100	139	29
Internal Link Dist (ft)	404			296	334	
Turn Bay Length (ft)		100				
Base Capacity (vph)	659	605		1702	943	893
Starvation Cap Reductn	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.25	0.04		0.30	0.34	0.21

Intersection Summary

Area Type: Other
 Cycle Length: 77
 Actuated Cycle Length: 77
 Natural Cycle: 50
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.34
 Intersection Signal Delay: 11.2
 Intersection LOS: B
 Intersection Capacity Utilization 33.7%
 ICU Level of Service A
 Analysis Period (min) 15






















Splits and Phases: 2: Rocky Ridge Rd & Shades Crest Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM with Long Term Improvements

04/17/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	12	5	224	6	354	6	707	405	222	292	13
Future Volume (vph)	18	12	5	224	6	354	6	707	405	222	292	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	75		200	0		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981				0.850			0.850		0.994	
Flt Protected		0.975			0.954		0.950			0.950		
Satd. Flow (prot)	0	1782	0	0	1777	1583	1770	1863	1583	1770	1852	0
Flt Permitted		0.629			0.725		0.526			0.085		
Satd. Flow (perm)	0	1149	0	0	1350	1583	980	1863	1583	158	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				265			412		4	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.54	0.54	0.54	0.74	0.74	0.74	0.84	0.84	0.84	0.76	0.76	0.76
Adj. Flow (vph)	33	22	9	303	8	478	7	842	482	292	384	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	64	0	0	311	478	7	842	482	292	401	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4	6		6	2		
Detector Phase	8	8		4	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	15.0	15.0	7.0	15.0	
Minimum Split (s)	19.0	19.0		19.0	19.0	19.0	12.0	20.0	20.0	12.0	20.0	
Total Split (s)	26.0	26.0		26.0	26.0	26.0	12.0	50.0	50.0	14.0	52.0	
Total Split (%)	28.9%	28.9%		28.9%	28.9%	28.9%	13.3%	55.6%	55.6%	15.6%	57.8%	
Maximum Green (s)	22.0	22.0		22.0	22.0	22.0	8.0	45.0	45.0	10.0	47.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.7	2.7		2.7	2.7	2.7	3.0	3.2	3.2	3.0	3.2	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0	0		0	
Act Effct Green (s)		21.5			21.5	21.5	51.1	43.0	43.0	57.9	54.9	
Actuated g/C Ratio		0.25			0.25	0.25	0.58	0.49	0.49	0.66	0.63	
v/c Ratio		0.22			0.94	0.81	0.01	0.92	0.49	1.01	0.35	
Control Delay		26.5			71.3	26.6	5.3	37.8	4.3	81.0	9.5	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		26.5			71.3	26.6	5.3	37.8	4.3	81.0	9.5	

Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM with Long Term Improvements

04/17/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			E	C	A	D	A	F	A	
Approach Delay		26.5			44.2			25.5				39.6
Approach LOS		C			D			C				D
Stops (vph)		24			193	152	3	589	50	118		139
Fuel Used(gal)		0			5	4	0	10	1	5		2
CO Emissions (g/hr)		25			382	286	2	698	95	334		140
NOx Emissions (g/hr)		5			74	56	0	136	19	65		27
VOC Emissions (g/hr)		6			88	66	1	162	22	77		32
Dilemma Vehicles (#)		0			11	0	0	0	0	0		0
Queue Length 50th (ft)		25			174	116	1	417	20	~124		88
Queue Length 95th (ft)		32			#240	149	5	#592	56	#206		153
Internal Link Dist (ft)		201			322			152				191
Turn Bay Length (ft)						200	75		200			
Base Capacity (vph)		296			340	597	654	959	1015	288		1162
Starvation Cap Reductn		0			0	0	0	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		0.22			0.91	0.80	0.01	0.88	0.47	1.01		0.35

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 87.6
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 34.1
 Intersection LOS: C
 Intersection Capacity Utilization 79.7%
 ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
 3: Blue Lake Rd/Cahaba Heights Rd & Driveway/Sicard Hollow Rd

2019 AM Signalized
 03/18/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (vph)	0	0	0	230	0	272	0	597	80	92	253	0
Future Volume (vph)	0	0	0	230	0	272	0	597	80	92	253	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt					0.927			0.984				
Flt Protected					0.978					0.950	0.998	
Satd. Flow (prot)	0	1881	0	0	1705	0	0	1851	0	1698	1784	0
Flt Permitted					0.853					0.082	0.695	
Satd. Flow (perm)	0	1881	0	0	1488	0	0	1851	0	147	1242	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					73			10				
Link Speed (mph)		15			35			35			35	
Link Distance (ft)		267			530			435			521	
Travel Time (s)		12.1			10.3			8.5			10.1	
Peak Hour Factor	0.92	0.92	0.92	0.86	0.86	0.86	0.75	0.75	0.75	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	0	0	0	267	0	316	0	796	107	106	291	0
Shared Lane Traffic (%)										10%		
Lane Group Flow (vph)	0	0	0	0	583	0	0	903	0	95	302	0
Turn Type				Perm	NA			NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		12.0	12.0		5.0	12.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		22.5	22.5		12.0	22.5	
Total Split (s)	32.0	32.0		32.0	32.0		46.0	46.0		12.0	58.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		51.1%	51.1%		13.3%	64.4%	
Maximum Green (s)	27.5	27.5		27.5	27.5		41.5	41.5		7.5	53.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5			4.5		4.5	4.5	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		None	Max	
Act Effct Green (s)					27.5			44.0		53.5	53.5	
Actuated g/C Ratio					0.31			0.49		0.59	0.59	
v/c Ratio					1.15			0.99		0.46	0.39	
Control Delay					117.8			53.7		16.9	10.7	
Queue Delay					0.0			0.0		0.0	0.0	
Total Delay					117.8			53.7		16.9	10.7	
LOS					F			D		B	B	
Approach Delay					117.8			53.7			12.2	

Lanes, Volumes, Timings
 3: Blue Lake Rd/Cahaba Heights Rd & Driveway/Sicard Hollow Rd

2019 AM Signalized
 03/18/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS					F			D				B
Stops (vph)					365			532		36	122	
Fuel Used(gal)					17			14		1	2	
CO Emissions (g/hr)					1165			945		61	173	
NOx Emissions (g/hr)					227			184		12	34	
VOC Emissions (g/hr)					270			219		14	40	
Dilemma Vehicles (#)					23			30		0	28	
Queue Length 50th (ft)					~365			~564		22	81	
Queue Length 95th (ft)					#529			#575		51	123	
Internal Link Dist (ft)		187			450			355			441	
Turn Bay Length (ft)										180		
Base Capacity (vph)					505			910		216	773	
Starvation Cap Reductn					0			0		0	0	
Spillback Cap Reductn					0			0		0	0	
Storage Cap Reductn					0			0		0	0	
Reduced v/c Ratio					1.15			0.99		0.44	0.39	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Natural Cycle: 140
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.15
 Intersection Signal Delay: 64.8
 Intersection LOS: E
 Intersection Capacity Utilization 83.9%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Blue Lake Rd/Cahaba Heights Rd & Driveway/Sicard Hollow Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM Short Term Improvements

04/17/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (vph)	18	12	5	224	6	354	6	707	405	222	292	13
Future Volume (vph)	18	12	5	224	6	354	6	707	405	222	292	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.918			0.945			0.994	
Flt Protected		0.975			0.981		0.950			0.950		
Satd. Flow (prot)	0	1782	0	0	1678	0	1770	1760	0	1770	1852	0
Flt Permitted		0.672			0.852		0.524			0.056		
Satd. Flow (perm)	0	1228	0	0	1457	0	976	1760	0	104	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			62			31			3	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.54	0.54	0.54	0.74	0.74	0.74	0.84	0.84	0.84	0.76	0.76	0.76
Adj. Flow (vph)	33	22	9	303	8	478	7	842	482	292	384	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	64	0	0	789	0	7	1324	0	292	401	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		12.0	20.0		12.0	20.0	
Total Split (s)	45.0	45.0		45.0	45.0		12.0	69.0		16.0	73.0	
Total Split (%)	34.6%	34.6%		34.6%	34.6%		9.2%	53.1%		12.3%	56.2%	
Maximum Green (s)	41.0	41.0		41.0	41.0		8.0	64.0		12.0	68.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	5.0		4.0	5.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.0	3.2		3.0	3.2	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		41.0			41.0		72.0	64.0		81.0	77.8	
Actuated g/C Ratio		0.32			0.32		0.55	0.49		0.62	0.60	
v/c Ratio		0.16			1.57		0.01	1.50		1.34	0.36	
Control Delay		30.0			297.8		9.7	258.9		211.9	15.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		30.0			297.8		9.7	258.9		211.9	15.1	
LOS		C			F		A	F		F	B	
Approach Delay		30.0			297.8			257.6			98.0	
Approach LOS		C			F			F			F	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd

2019 AM Short Term Improvements

04/17/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		22			382		3	786		128	153	
Fuel Used(gal)		0			40		0	65		11	2	
CO Emissions (g/hr)		27			2794		3	4542		752	170	
NOx Emissions (g/hr)		5			544		1	884		146	33	
VOC Emissions (g/hr)		6			648		1	1053		174	39	
Dilemma Vehicles (#)		0			14		0	0		0	0	
Queue Length 50th (ft)		34			~912		2	~1544		~272	155	
Queue Length 95th (ft)		40			#867		8	#1638		#347	216	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		392			501		596	882		218	1109	
Starvation Cap Reductn		0			0		0	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		0.16			1.57		0.01	1.50		1.34	0.36	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Natural Cycle: 140
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.57
 Intersection Signal Delay: 225.1
 Intersection LOS: F
 Intersection Capacity Utilization 124.3%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
1: Columbiana Rd & Shades Crest Rd/Vestaview Ln

2019 PM Improved
03/20/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕	↗	↗	↕	↗
Traffic Volume (vph)	65	88	13	113	166	108	28	460	115	199	894	295
Future Volume (vph)	65	88	13	113	166	108	28	460	115	199	894	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	115		0	140		350
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.989			0.962				0.850			0.850
Flt Protected		0.981			0.986		0.950			0.950		
Satd. Flow (prot)	0	1807	0	0	1767	0	1770	3539	1583	1770	3539	1583
Flt Permitted		0.662			0.831		0.950			0.314		
Satd. Flow (perm)	0	1220	0	0	1489	0	1770	3539	1583	585	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			25				142			304
Link Speed (mph)		30			30			45				45
Link Distance (ft)		493			298			271				469
Travel Time (s)		11.2			6.8			4.1				7.1
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.81	0.81	0.81	0.97	0.97	0.97
Adj. Flow (vph)	74	100	15	123	180	117	35	568	142	205	922	304
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	189	0	0	420	0	35	568	142	205	922	304
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	18.0	18.0	5.0	18.0	18.0
Minimum Split (s)	23.0	23.0		23.0	23.0		12.0	23.5	23.5	12.0	23.5	23.5
Total Split (s)	40.0	40.0		40.0	40.0		12.0	32.0	32.0	18.0	38.0	38.0
Total Split (%)	44.4%	44.4%		44.4%	44.4%		13.3%	35.6%	35.6%	20.0%	42.2%	42.2%
Maximum Green (s)	34.0	34.0		34.0	34.0		6.0	26.5	26.5	12.0	32.5	32.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.5	2.5		2.5	2.5		3.0	1.5	1.5	3.0	1.5	1.5
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		6.0			6.0		6.0	5.5	5.5	6.0	5.5	5.5
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.5	3.5	2.0	3.5	3.5
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0							
Flash Dont Walk (s)	10.0	10.0		10.0	10.0							
Pedestrian Calls (#/hr)	0	0		0	0							
Act Effct Green (s)		28.4			28.4		5.8	34.4	34.4	49.0	42.7	42.7
Actuated g/C Ratio		0.32			0.32		0.06	0.38	0.38	0.54	0.47	0.47
v/c Ratio		0.49			0.86		0.31	0.42	0.20	0.46	0.55	0.33
Control Delay		27.3			44.6		47.5	23.5	5.2	10.5	14.0	1.5
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.1	0.0
Total Delay		27.3			44.6		47.5	23.5	5.2	10.5	14.0	1.5

Lanes, Volumes, Timings
 1: Columbiana Rd & Shades Crest Rd/Vestaview Ln

2019 PM Improved
 03/20/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			D		D	C	A	B	B	A
Approach Delay		27.3			44.6			21.1			10.9	
Approach LOS		C			D			C			B	
Stops (vph)		124			332		28	336	16	59	554	29
Fuel Used(gal)		2			6		1	7	1	2	12	1
CO Emissions (g/hr)		157			436		47	502	37	123	850	94
NOx Emissions (g/hr)		31			85		9	98	7	24	165	18
VOC Emissions (g/hr)		36			101		11	116	8	29	197	22
Dilemma Vehicles (#)		0			0		0	26	0	0	42	0
Queue Length 50th (ft)		82			207		19	125	0	29	238	25
Queue Length 95th (ft)		130			305		45	171	31	68	165	2
Internal Link Dist (ft)		413			218			191			389	
Turn Bay Length (ft)							115			140		350
Base Capacity (vph)		464			578		120	1353	693	479	1680	911
Starvation Cap Reductn		0			0		0	0	0	0	72	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		0.41			0.73		0.29	0.42	0.20	0.43	0.57	0.33

Intersection Summary












Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green, Master Intersection
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 19.8
 Intersection Capacity Utilization 69.0%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 1: Columbiana Rd & Shades Crest Rd/Vestaview Ln



Lanes, Volumes, Timings
2: Columbiana Rd & Shades Crest Rd

2019 PM Improved
03/20/2019

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	291	114	537	96	78	1097
Future Volume (vph)	291	114	537	96	78	1097
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		160	150	
Storage Lanes	1	0		1	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	0.962			0.850		
Flt Protected	0.965				0.950	
Satd. Flow (prot)	1729	0	3539	1583	1770	3539
Flt Permitted	0.965				0.292	
Satd. Flow (perm)	1729	0	3539	1583	544	3539
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	26			120		
Link Speed (mph)	30		45			45
Link Distance (ft)	299		469			333
Travel Time (s)	6.8		7.1			5.0
Peak Hour Factor	0.89	0.89	0.80	0.80	0.94	0.94
Adj. Flow (vph)	327	128	671	120	83	1167
Shared Lane Traffic (%)						
Lane Group Flow (vph)	455	0	671	120	83	1167
Turn Type	Prot		NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases				2	6	
Detector Phase	8		2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		18.0	18.0	5.0	18.0
Minimum Split (s)	22.5		22.5	22.5	12.0	22.5
Total Split (s)	41.0		37.0	37.0	12.0	49.0
Total Split (%)	45.6%		41.1%	41.1%	13.3%	54.4%
Maximum Green (s)	36.5		32.5	32.5	7.5	44.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	5.0		3.0	3.0	3.0	3.0
Recall Mode	None		C-Min	C-Min	None	C-Min
Walk Time (s)			7.0	7.0		7.0
Flash Dont Walk (s)			11.0	11.0		11.0
Pedestrian Calls (#/hr)			0	0		0
Act Effct Green (s)	29.5		42.0	42.0	51.5	51.5
Actuated g/C Ratio	0.33		0.47	0.47	0.57	0.57
v/c Ratio	0.78		0.41	0.15	0.20	0.58
Control Delay	35.0		10.9	0.9	11.7	14.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	35.0		10.9	0.9	11.7	14.8

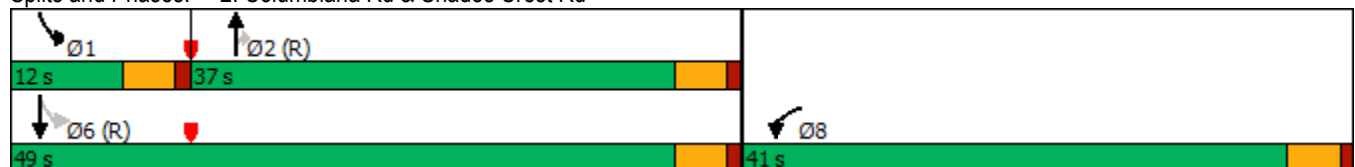


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	C		B	A	B	B
Approach Delay	35.0		9.4			14.6
Approach LOS	C		A			B
Stops (vph)	332		172	2	37	684
Fuel Used(gal)	6		5	0	1	14
CO Emissions (g/hr)	396		347	23	57	991
NOx Emissions (g/hr)	77		68	5	11	193
VOC Emissions (g/hr)	92		80	5	13	230
Dilemma Vehicles (#)	0		21	0	0	61
Queue Length 50th (ft)	215		80	1	20	212
Queue Length 95th (ft)	291		67	m2	48	323
Internal Link Dist (ft)	219		389			253
Turn Bay Length (ft)				160	150	
Base Capacity (vph)	716		1649	802	416	2025
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.64		0.41	0.15	0.20	0.58

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 16.7
 Intersection LOS: B
 Intersection Capacity Utilization 60.9%
 ICU Level of Service B
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Columbiana Rd & Shades Crest Rd



Lanes, Volumes, Timings
1: Dolly Ridge Rd & Gresham Dr

2019 PM Improved
04/15/2019



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	12	9	0	167	229	7
Future Volume (vph)	12	9	0	167	229	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	300			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.996	
Flt Protected	0.950					
Satd. Flow (prot)	1787	1599	1881	1881	1874	0
Flt Permitted	0.950					
Satd. Flow (perm)	1787	1599	1881	1881	1874	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		16			3	
Link Speed (mph)	25			35	35	
Link Distance (ft)	737			474	400	
Travel Time (s)	20.1			9.2	7.8	
Peak Hour Factor	0.58	0.58	0.77	0.77	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	21	16	0	217	241	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	21	16	0	217	248	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		5	2	6	
Permitted Phases		4	2	2		
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	12.0	12.0	
Minimum Split (s)	14.0	14.0	12.0	16.5	16.5	
Total Split (s)	20.0	20.0	12.0	60.0	48.0	
Total Split (%)	25.0%	25.0%	15.0%	75.0%	60.0%	
Maximum Green (s)	16.0	16.0	8.0	55.5	43.5	
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.5	4.5	3.0	3.2	3.2	
Recall Mode	None	None	None	Min	Min	
Act Effct Green (s)	10.2	10.2		28.9	28.9	
Actuated g/C Ratio	0.29	0.29		0.82	0.82	
v/c Ratio	0.04	0.03		0.14	0.16	
Control Delay	11.0	6.7		3.5	3.6	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	11.0	6.7		3.5	3.6	
LOS	B	A		A	A	
Approach Delay	9.1			3.5	3.6	



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Approach LOS	A			A	A	
Stops (vph)	11	6		51	71	
Fuel Used(gal)	0	0		1	1	
CO Emissions (g/hr)	10	6		75	97	
NOx Emissions (g/hr)	2	1		15	19	
VOC Emissions (g/hr)	2	1		17	22	
Dilemma Vehicles (#)	0	0		13	18	
Queue Length 50th (ft)	2	0		0	0	
Queue Length 95th (ft)	8	4		37	51	
Internal Link Dist (ft)	657			394	320	
Turn Bay Length (ft)						
Base Capacity (vph)	826	748		1881	1857	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.03	0.02		0.12	0.13	

Intersection Summary























Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 35.3
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.16
 Intersection Signal Delay: 4.0
 Intersection LOS: A
 Intersection Capacity Utilization 27.9%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 1: Dolly Ridge Rd & Gresham Dr



Lanes, Volumes, Timings
1: US-31 & Shades Crest Rd

2019 PM Improved
03/18/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	84	40	158	74	72	35	991	186	253	2073	330
Future Volume (vph)	67	84	40	158	74	72	35	991	186	253	2073	330
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	250		0	300		175	0		375
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.952			0.926				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1773	0	1770	1725	0	1770	3539	1583	1770	3539	1583
Flt Permitted	0.464			0.446			0.950			0.187		
Satd. Flow (perm)	864	1773	0	831	1725	0	1770	3539	1583	348	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			22				147			194
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		480			504			393			502	
Travel Time (s)		10.9			11.5			6.0			7.6	
Peak Hour Factor	0.71	0.71	0.71	0.88	0.88	0.88	0.87	0.87	0.87	0.92	0.92	0.92
Adj. Flow (vph)	94	118	56	180	84	82	40	1139	214	275	2253	359
Shared Lane Traffic (%)												
Lane Group Flow (vph)	94	174	0	180	166	0	40	1139	214	275	2253	359
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	29.5	29.5		29.5	29.5		12.0	25.0	25.0	12.0	25.0	25.0
Total Split (s)	45.0	45.0		45.0	45.0		40.0	135.0	135.0	20.0	115.0	115.0
Total Split (%)	22.5%	22.5%		22.5%	22.5%		20.0%	67.5%	67.5%	10.0%	57.5%	57.5%
Maximum Green (s)	40.5	40.5		40.5	40.5		35.5	130.0	130.0	15.5	110.0	110.0
Yellow Time (s)	3.5	3.5		3.5	3.5		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		0.5	1.0	1.0	0.5	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	5.0	5.0	4.5	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Walk Time (s)	7.0	7.0		7.0	7.0							
Flash Dont Walk (s)	18.0	18.0		18.0	18.0							
Pedestrian Calls (#/hr)	0	0		0	0							
Act Effct Green (s)	40.5	40.5		40.5	40.5		10.9	130.9	130.9	149.5	136.9	136.9
Actuated g/C Ratio	0.20	0.20		0.20	0.20		0.05	0.65	0.65	0.75	0.68	0.68
v/c Ratio	0.54	0.47		1.07	0.45		0.42	0.49	0.20	0.76	0.93	0.31
Control Delay	84.3	70.7		160.2	64.9		103.5	18.6	4.7	23.1	36.4	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.3	70.7		160.2	64.9		103.5	18.6	4.7	23.1	36.4	6.6

Lanes, Volumes, Timings
1: US-31 & Shades Crest Rd

2019 PM Improved
03/18/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	F	E		F	E		F	B	A	C	D	A
Approach Delay		75.4			114.5			18.9			31.4	
Approach LOS		E			F			B			C	
Stops (vph)	61	102		133	110		33	489	23	76	1685	61
Fuel Used(gal)	2	3		7	3		1	12	1	3	43	2
CO Emissions (g/hr)	121	197		455	218		86	864	66	207	3012	159
NOx Emissions (g/hr)	24	38		89	42		17	168	13	40	586	31
VOC Emissions (g/hr)	28	46		105	50		20	200	15	48	698	37
Dilemma Vehicles (#)	0	0		0	0		0	25	0	0	51	0
Queue Length 50th (ft)	112	192		~261	169		52	393	31	98	1345	78
Queue Length 95th (ft)	141	212		#427	248		95	423	62	148	#1592	140
Internal Link Dist (ft)		400			424			313			422	
Turn Bay Length (ft)	250			250			300		175			375
Base Capacity (vph)	174	367		168	366		314	2317	1087	370	2422	1144
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.47		1.07	0.45		0.13	0.49	0.20	0.74	0.93	0.31

Intersection Summary




















Area Type: Other
 Cycle Length: 200
 Actuated Cycle Length: 200
 Offset: 188 (94%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 36.1
 Intersection LOS: D
 Intersection Capacity Utilization 94.2%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: US-31 & Shades Crest Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & US-280

03/18/2019

						
Lane Group	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations	 	  	  		  	
Traffic Volume (vph)	309	2834	4637	668	324	265
Future Volume (vph)	309	2834	4637	668	324	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	350			0	100	100
Storage Lanes	2			1	0	0
Taper Length (ft)	75				75	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.94	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3433	5085	5085	1583	4990	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	3433	5085	5085	1583	4990	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				180		205
Link Speed (mph)		55	55		40	
Link Distance (ft)		616	491		414	
Travel Time (s)		7.6	6.1		7.1	
Peak Hour Factor	0.98	0.98	0.93	0.93	0.80	0.80
Adj. Flow (vph)	315	2892	4986	718	405	331
Shared Lane Traffic (%)						
Lane Group Flow (vph)	315	2892	4986	718	405	331
Turn Type	Prot	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	8.0	12.0	12.0	12.0	8.0	8.0
Minimum Split (s)	12.5	24.5	24.5	24.5	22.5	22.5
Total Split (s)	40.0	200.0	160.0	160.0	40.0	40.0
Total Split (%)	16.7%	83.3%	66.7%	66.7%	16.7%	16.7%
Maximum Green (s)	35.5	193.5	153.5	153.5	35.5	35.5
Yellow Time (s)	3.5	5.5	5.5	5.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	6.5	6.5	6.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	Max	Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	26.5	193.7	162.7	162.7	27.4	27.4
Actuated g/C Ratio	0.11	0.83	0.70	0.70	0.12	0.12
v/c Ratio	0.81	0.68	1.40	0.62	0.69	0.90
Control Delay	116.4	8.9	211.2	16.8	104.3	65.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.6
Total Delay	116.4	8.9	211.2	16.8	104.3	65.8

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & US-280

03/18/2019



Lane Group	NBL	NBT	SBT	SBR	NEL	NER
LOS	F	A	F	B	F	E
Approach Delay		19.5	186.7		87.0	
Approach LOS		B	F		F	
Stops (vph)	298	1041	3338	275	306	107
Fuel Used(gal)	14	36	276	9	11	5
CO Emissions (g/hr)	983	2485	19280	662	755	371
NOx Emissions (g/hr)	191	483	3751	129	147	72
VOC Emissions (g/hr)	228	576	4468	153	175	86
Dilemma Vehicles (#)	0	61	22	0	0	0
Queue Length 50th (ft)	246	544	~3702	416	215	209
Queue Length 95th (ft)	311	703	#3894	667	227	262
Internal Link Dist (ft)		536	411		334	
Turn Bay Length (ft)	350				100	100
Base Capacity (vph)	525	4243	3564	1163	763	415
Starvation Cap Reductn	0	0	0	0	0	9
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.68	1.40	0.62	0.53	0.82

Intersection Summary

Area Type: Other
 Cycle Length: 240
 Actuated Cycle Length: 232.1
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.40
 Intersection Signal Delay: 123.5
 Intersection LOS: F
 Intersection Capacity Utilization 118.0%
 ICU Level of Service H
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & US-280



Lanes, Volumes, Timings
2: Rocky Ridge Rd & Shades Crest Rd

03/18/2019



Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	264	19	17	325	693	284
Future Volume (vph)	264	19	17	325	693	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	100	125			0
Storage Lanes	1	1	1			1
Taper Length (ft)	75		75			
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00
Fr _t		0.850				0.850
Fl _t Protected	0.950			0.997		
Satd. Flow (prot)	1770	1583	0	3529	1863	1583
Fl _t Permitted	0.950			0.894		
Satd. Flow (perm)	1770	1583	0	3164	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		21				305
Link Speed (mph)	25			40	40	
Link Distance (ft)	484			376	414	
Travel Time (s)	13.2			6.4	7.1	
Peak Hour Factor	0.90	0.90	0.87	0.87	0.93	0.93
Adj. Flow (vph)	293	21	20	374	745	305
Shared Lane Traffic (%)						
Lane Group Flow (vph)	293	21	0	394	745	305
Turn Type	Prot	Perm	Perm	NA	NA	Perm
Protected Phases	4			6	2	
Permitted Phases		4	6			2
Detector Phase	4	4	6	6	2	2
Switch Phase						
Minimum Initial (s)	7.0	7.0	12.0	12.0	12.0	12.0
Minimum Split (s)	22.5	22.5	23.0	23.0	23.0	23.0
Total Split (s)	32.0	32.0	45.0	45.0	45.0	45.0
Total Split (%)	41.6%	41.6%	58.4%	58.4%	58.4%	58.4%
Maximum Green (s)	27.7	27.7	40.0	40.0	40.0	40.0
Yellow Time (s)	3.1	3.1	3.8	3.8	3.8	3.8
All-Red Time (s)	1.2	1.2	1.2	1.2	1.2	1.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.3	4.3		5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	8.0	8.0	8.0	8.0	8.0	8.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	27.7	27.7		40.0	40.0	40.0
Actuated g/C Ratio	0.36	0.36		0.52	0.52	0.52
v/c Ratio	0.46	0.04		0.24	0.77	0.32
Control Delay	21.8	7.4		10.6	21.6	2.2
Queue Delay	0.0	0.0		0.0	10.4	0.0
Total Delay	21.8	7.4		10.6	32.0	2.2

Lanes, Volumes, Timings
 2: Rocky Ridge Rd & Shades Crest Rd

03/18/2019

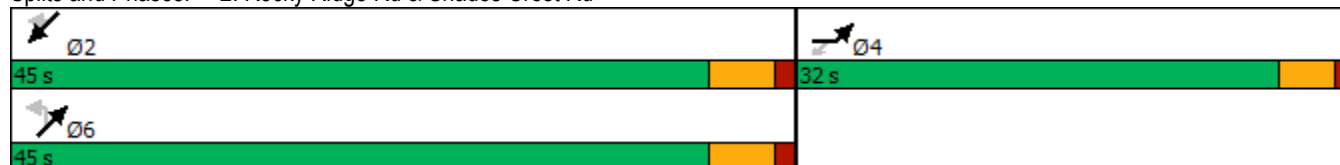


Lane Group	EBL	EBR	NEL	NET	SWT	SWR
LOS	C	A		B	C	A
Approach Delay	20.9			10.6	23.4	
Approach LOS	C			B	C	
Stops (vph)	196	6		176	536	21
Fuel Used(gal)	3	0		3	10	1
CO Emissions (g/hr)	211	9		234	717	79
NOx Emissions (g/hr)	41	2		46	140	15
VOC Emissions (g/hr)	49	2		54	166	18
Dilemma Vehicles (#)	0	0		22	45	0
Queue Length 50th (ft)	106	0		51	267	0
Queue Length 95th (ft)	175	14		73	415	35
Internal Link Dist (ft)	404			296	334	
Turn Bay Length (ft)		100				
Base Capacity (vph)	636	582		1643	967	968
Starvation Cap Reductn	0	0		0	200	0
Spillback Cap Reductn	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0
Reduced v/c Ratio	0.46	0.04		0.24	0.97	0.32

Intersection Summary

Area Type: Other
 Cycle Length: 77
 Actuated Cycle Length: 77
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 20.1
 Intersection LOS: C
 Intersection Capacity Utilization 58.8%
 ICU Level of Service B
 Analysis Period (min) 15






















Splits and Phases: 2: Rocky Ridge Rd & Shades Crest Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 PM with Long Term Improvements

04/17/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	12	9	102	8	90	16	375	67	109	691	35
Future Volume (vph)	30	12	9	102	8	90	16	375	67	109	691	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	75		200	0		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.975				0.850			0.850		0.993	
Flt Protected		0.972			0.956		0.950			0.950		
Satd. Flow (prot)	0	1765	0	0	1781	1583	1770	1863	1583	1770	1850	0
Flt Permitted		0.771			0.699		0.244			0.363		
Satd. Flow (perm)	0	1400	0	0	1302	1583	455	1863	1583	676	1850	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				108			84		5	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	35	14	11	123	10	108	20	469	84	122	776	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	0	133	108	20	469	84	122	815	0
Turn Type	Perm	NA		Perm	NA	custom	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		8	6		6	2		
Detector Phase	8	8		4	4	8	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	15.0	15.0	7.0	15.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	12.0	23.0	23.0	12.0	23.0	
Total Split (s)	22.0	22.0		22.0	22.0	22.0	12.0	41.0	41.0	12.0	41.0	
Total Split (%)	29.3%	29.3%		29.3%	29.3%	29.3%	16.0%	54.7%	54.7%	16.0%	54.7%	
Maximum Green (s)	18.0	18.0		18.0	18.0	18.0	8.0	36.0	36.0	8.0	36.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.7	2.7		2.7	2.7	2.7	3.0	3.2	3.2	3.0	3.2	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0	0		0	
Act Effct Green (s)		10.8			10.8	10.8	32.5	27.5	27.5	35.4	34.7	
Actuated g/C Ratio		0.21			0.21	0.21	0.63	0.53	0.53	0.68	0.67	
v/c Ratio		0.20			0.49	0.26	0.04	0.47	0.10	0.20	0.66	
Control Delay		18.9			27.8	7.2	4.3	13.8	3.2	4.8	13.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		18.9			27.8	7.2	4.3	13.8	3.2	4.8	13.4	

Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 PM with Long Term Improvements

04/17/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B			C	A	A	B	A	A	B	
Approach Delay		18.9			18.5			11.9				12.3
Approach LOS		B			B			B				B
Stops (vph)		36			89	18	6	245	10	35		402
Fuel Used(gal)		0			2	1	0	3	0	1		6
CO Emissions (g/hr)		32			113	37	5	216	15	37		401
NOx Emissions (g/hr)		6			22	7	1	42	3	7		78
VOC Emissions (g/hr)		7			26	9	1	50	4	9		93
Dilemma Vehicles (#)		0			7	0	0	0	0	0		0
Queue Length 50th (ft)		12			36	0	2	106	0	11		132
Queue Length 95th (ft)		44			92	30	8	185	16	34		#540
Internal Link Dist (ft)		201			322			152				191
Turn Bay Length (ft)						200	75		200			
Base Capacity (vph)		523			480	652	507	1364	1181	640		1356
Starvation Cap Reductn		0			0	0	0	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		0.11			0.28	0.17	0.04	0.34	0.07	0.19		0.60

Intersection Summary

Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 51.9
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 13.3
 Intersection LOS: B
 Intersection Capacity Utilization 64.7%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
 3: Blue Lake Rd/Cahaba Heights Rd & Driveway/Sicard Hollow Rd

2019 PM Signalized
 03/20/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕		↕	↕	
Traffic Volume (vph)	0	0	0	90	0	79	0	464	256	184	320	0
Future Volume (vph)	0	0	0	90	0	79	0	464	256	184	320	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.937			0.952				
Flt Protected					0.974					0.950		
Satd. Flow (prot)	0	1881	0	0	1717	0	0	1791	0	1787	1881	0
Flt Permitted					0.833					0.181		
Satd. Flow (perm)	0	1881	0	0	1468	0	0	1791	0	340	1881	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					77			48				
Link Speed (mph)		15			35			35				35
Link Distance (ft)		267			530			435				521
Travel Time (s)		12.1			10.3			8.5				10.1
Peak Hour Factor	0.92	0.92	0.92	0.88	0.88	0.88	0.92	0.92	0.92	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	0	0	0	102	0	90	0	504	278	214	372	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	192	0	0	782	0	214	372	0
Turn Type				Perm	NA			NA		pm+pt	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		12.0	22.5	
Total Split (s)	22.6	22.6		22.6	22.6		48.4	48.4		14.0	62.4	
Total Split (%)	26.6%	26.6%		26.6%	26.6%		56.9%	56.9%		16.5%	73.4%	
Maximum Green (s)	18.1	18.1		18.1	18.1		43.9	43.9		9.5	57.9	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5			4.5		4.5	4.5	
Lead/Lag							Lag	Lag		Lead		
Lead-Lag Optimize?							Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		None	Max	
Act Effct Green (s)					11.6			45.5		58.1	58.1	
Actuated g/C Ratio					0.15			0.58		0.74	0.74	
v/c Ratio					0.68			0.74		0.54	0.27	
Control Delay					31.6			18.6		8.9	4.5	
Queue Delay					0.0			0.0		0.0	0.0	
Total Delay					31.6			18.6		8.9	4.5	
LOS					C			B		A	A	
Approach Delay					31.6			18.6			6.1	

Lanes, Volumes, Timings
 3: Blue Lake Rd/Cahaba Heights Rd & Driveway/Sicard Hollow Rd

2019 PM Signalized
 03/20/2019

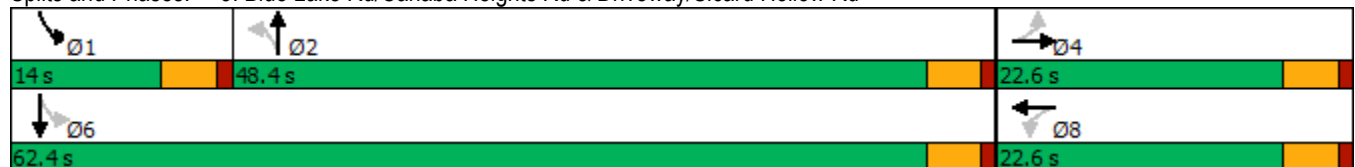


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS					C			B				A
Stops (vph)					94			485		53		97
Fuel Used(gal)					2			9		1		2
CO Emissions (g/hr)					171			603		99		156
NOx Emissions (g/hr)					33			117		19		30
VOC Emissions (g/hr)					40			140		23		36
Dilemma Vehicles (#)					9			38		0		20
Queue Length 50th (ft)					53			245		25		47
Queue Length 95th (ft)					114			#549		57		99
Internal Link Dist (ft)		187			450			355				441
Turn Bay Length (ft)										180		
Base Capacity (vph)					397			1054		426		1388
Starvation Cap Reductn					0			0		0		0
Spillback Cap Reductn					0			0		0		0
Storage Cap Reductn					0			0		0		0
Reduced v/c Ratio					0.48			0.74		0.50		0.27

Intersection Summary

Area Type: Other
 Cycle Length: 85
 Actuated Cycle Length: 78.7
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 15.5
 Intersection LOS: B
 Intersection Capacity Utilization 77.9%
 ICU Level of Service D
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.



















Splits and Phases: 3: Blue Lake Rd/Cahaba Heights Rd & Driveway/Sicard Hollow Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 PM with Short Term Improvements

04/17/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	12	9	102	8	90	16	375	67	109	691	35
Future Volume (vph)	30	12	9	102	8	90	16	375	67	109	691	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.975			0.940			0.977			0.993	
Flt Protected		0.972			0.975		0.950			0.950		
Satd. Flow (prot)	0	1765	0	0	1707	0	1770	1820	0	1770	1850	0
Flt Permitted		0.769			0.808		0.207			0.274		
Satd. Flow (perm)	0	1397	0	0	1415	0	386	1820	0	510	1850	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			54			20			6	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.85	0.85	0.85	0.83	0.83	0.83	0.80	0.80	0.80	0.89	0.89	0.89
Adj. Flow (vph)	35	14	11	123	10	108	20	469	84	122	776	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	0	0	241	0	20	553	0	122	815	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		12.0	20.0		12.0	20.0	
Total Split (s)	15.0	15.0		15.0	15.0		12.0	38.0		12.0	38.0	
Total Split (%)	23.1%	23.1%		23.1%	23.1%		18.5%	58.5%		18.5%	58.5%	
Maximum Green (s)	11.0	11.0		11.0	11.0		8.0	33.0		8.0	33.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	5.0		4.0	5.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.0	3.2		3.0	3.2	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		10.5			10.5		29.7	23.3		32.6	30.2	
Actuated g/C Ratio		0.20			0.20		0.57	0.45		0.63	0.58	
v/c Ratio		0.21			0.73		0.05	0.67		0.24	0.75	
Control Delay		19.8			33.7		3.6	16.3		4.6	15.1	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		19.8			33.7		3.6	16.3		4.6	15.1	
LOS		B			C		A	B		A	B	
Approach Delay		19.8			33.7			15.9			13.8	
Approach LOS		B			C			B			B	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd

2019 PM with Short Term Improvements

04/17/2019

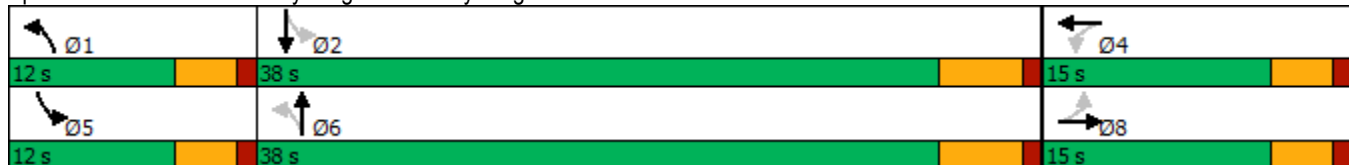


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		37			121		6	311		33	451	
Fuel Used(gal)		0			3		0	4		1	6	
CO Emissions (g/hr)		33			200		5	279		36	437	
NOx Emissions (g/hr)		6			39		1	54		7	85	
VOC Emissions (g/hr)		8			46		1	65		8	101	
Dilemma Vehicles (#)		0			16		0	0		0	0	
Queue Length 50th (ft)		12			52		2	133		12	141	
Queue Length 95th (ft)		44			#165		6	186		24	#467	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		316			353		447	1209		521	1259	
Starvation Cap Reductn		0			0		0	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		0.19			0.68		0.04	0.46		0.23	0.65	

Intersection Summary

Area Type: Other
 Cycle Length: 65
 Actuated Cycle Length: 51.9
 Natural Cycle: 65
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 17.3
 Intersection LOS: B
 Intersection Capacity Utilization 68.5%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
1: Dolly Ridge Rd & Gresham Dr

2019 School PM Improved
04/15/2019



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	75	298	205	154	149	107
Future Volume (vph)	75	298	205	154	149	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	300			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.948	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1787	1599	1787	1881	1783	0
Flt Permitted	0.950		0.373			
Satd. Flow (perm)	1787	1599	702	1881	1783	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		608			34	
Link Speed (mph)	25			35	35	
Link Distance (ft)	737			474	400	
Travel Time (s)	20.1			9.2	7.8	
Peak Hour Factor	0.49	0.49	0.94	0.83	0.82	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	153	608	218	186	182	114
Shared Lane Traffic (%)						
Lane Group Flow (vph)	153	608	218	186	296	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	4		1	6	2	
Permitted Phases		4	6			
Detector Phase	4	4	1	6	2	
Switch Phase						
Minimum Initial (s)	10.0	10.0	6.0	12.0	12.0	
Minimum Split (s)	14.0	14.0	12.0	16.5	16.5	
Total Split (s)	38.0	38.0	23.0	52.0	29.0	
Total Split (%)	42.2%	42.2%	25.6%	57.8%	32.2%	
Maximum Green (s)	34.0	34.0	19.0	47.5	24.5	
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	3.0	3.2	3.2	
Recall Mode	None	None	None	Min	Min	
Act Effct Green (s)	15.8	15.8	29.2	28.7	15.1	
Actuated g/C Ratio	0.30	0.30	0.55	0.54	0.28	
v/c Ratio	0.29	0.67	0.38	0.18	0.56	
Control Delay	16.9	6.1	9.3	7.9	20.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	16.9	6.1	9.3	7.9	20.5	
LOS	B	A	A	A	C	
Approach Delay	8.2			8.6	20.5	

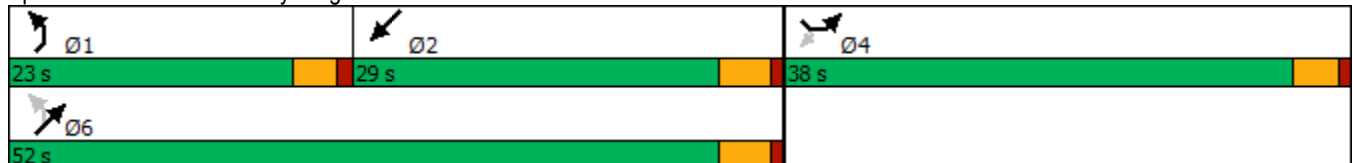


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Approach LOS	A			A	C	
Stops (vph)	50	31	93	69	177	
Fuel Used(gal)	1	2	2	1	3	
CO Emissions (g/hr)	64	165	125	90	220	
NOx Emissions (g/hr)	13	32	24	18	43	
VOC Emissions (g/hr)	15	38	29	21	51	
Dilemma Vehicles (#)	0	0	0	10	17	
Queue Length 50th (ft)	33	0	29	25	64	
Queue Length 95th (ft)	47	0	87	69	156	
Internal Link Dist (ft)	657			394	320	
Turn Bay Length (ft)			300			
Base Capacity (vph)	1193	1270	788	1669	876	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.13	0.48	0.28	0.11	0.34	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 53.4
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 10.8
 Intersection LOS: B
 Intersection Capacity Utilization 44.5%
 ICU Level of Service A
 Analysis Period (min) 15






















Splits and Phases: 1: Dolly Ridge Rd & Gresham Dr



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 School PM with Long Term Improvements

04/17/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	27	15	221	30	231	14	314	137	229	500	35
Future Volume (vph)	26	27	15	221	30	231	14	314	137	229	500	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	75		200	0		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970				0.850			0.850		0.990	
Flt Protected		0.981			0.958		0.950			0.950		
Satd. Flow (prot)	0	1773	0	0	1785	1583	1770	1863	1583	1770	1844	0
Flt Permitted		0.790			0.759		0.325			0.369		
Satd. Flow (perm)	0	1427	0	0	1414	1583	605	1863	1583	687	1844	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20				263			156		7	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.88	0.88	0.88	0.77	0.77	0.77
Adj. Flow (vph)	34	36	20	251	34	263	16	357	156	297	649	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	90	0	0	285	263	16	357	156	297	694	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	8	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	15.0	15.0	7.0	15.0	
Minimum Split (s)	19.0	19.0		19.0	19.0	19.0	12.0	20.0	20.0	12.0	20.0	
Total Split (s)	19.0	19.0		19.0	19.0	19.0	12.0	26.0	26.0	15.0	29.0	
Total Split (%)	31.7%	31.7%		31.7%	31.7%	31.7%	20.0%	43.3%	43.3%	25.0%	48.3%	
Maximum Green (s)	15.0	15.0		15.0	15.0	15.0	8.0	21.0	21.0	11.0	24.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	4.0	4.0	3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0			4.0	4.0	4.0	5.0	5.0	4.0	5.0	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.7	2.7		2.7	2.7	2.7	3.0	3.2	3.2	3.0	3.2	
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	
Walk Time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0	0		0	
Act Effct Green (s)		13.8			13.8	13.8	25.5	17.5	17.5	32.5	29.5	
Actuated g/C Ratio		0.25			0.25	0.25	0.47	0.32	0.32	0.60	0.54	
v/c Ratio		0.24			0.79	0.44	0.04	0.60	0.25	0.49	0.69	
Control Delay		16.0			39.0	5.6	5.3	20.8	4.2	8.4	16.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		16.0			39.0	5.6	5.3	20.8	4.2	8.4	16.6	

Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 School PM with Long Term Improvements

04/17/2019

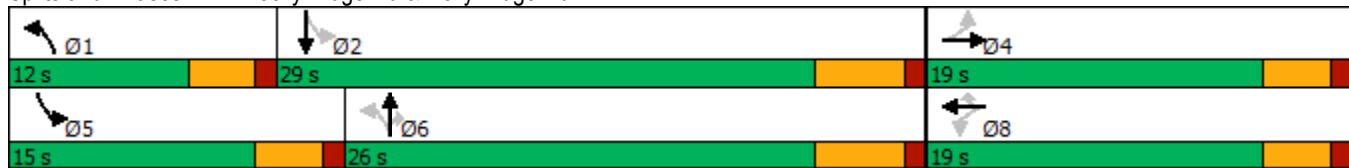


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B			D	A	A	C	A	A	B	
Approach Delay		16.0			23.0			15.4			14.1	
Approach LOS		B			C			B			B	
Stops (vph)		43			203	34	8	248	20	98	329	
Fuel Used(gal)		1			4	1	0	3	0	1	5	
CO Emissions (g/hr)		38			297	83	6	229	33	99	332	
NOx Emissions (g/hr)		7			58	16	1	44	6	19	65	
VOC Emissions (g/hr)		9			69	19	1	53	8	23	77	
Dilemma Vehicles (#)		0			19	0	0	0	0	0	0	
Queue Length 50th (ft)		18			85	0	2	101	0	42	137	
Queue Length 95th (ft)		42			#205	45	7	168	30	61	#293	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)						200	75		200			
Base Capacity (vph)		411			393	630	468	726	712	631	1002	
Starvation Cap Reductn		0			0	0	0	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		0.22			0.73	0.42	0.03	0.49	0.22	0.47	0.69	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 54.4
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 16.8
 Intersection LOS: B
 Intersection Capacity Utilization 65.6%
 ICU Level of Service C
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.



















Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Lanes, Volumes, Timings
1: Rocky Ridge Rd & Dolly Ridge Rd

2019 School PM with Short Term Improvements

04/17/2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	27	15	221	30	231	14	314	137	229	500	35
Future Volume (vph)	26	27	15	221	30	231	14	314	137	229	500	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	75		0	0		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970			0.935			0.954			0.990	
Flt Protected		0.981			0.978		0.950			0.950		
Satd. Flow (prot)	0	1773	0	0	1703	0	1770	1777	0	1770	1844	0
Flt Permitted		0.790			0.823		0.231			0.171		
Satd. Flow (perm)	0	1427	0	0	1433	0	430	1777	0	319	1844	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			58			27			5	
Link Speed (mph)		25			35			30			30	
Link Distance (ft)		281			402			232			271	
Travel Time (s)		7.7			7.8			5.3			6.2	
Peak Hour Factor	0.76	0.76	0.76	0.88	0.88	0.88	0.88	0.88	0.88	0.77	0.77	0.77
Adj. Flow (vph)	34	36	20	251	34	263	16	357	156	297	649	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	90	0	0	548	0	16	513	0	297	694	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Detector Phase	8	8		4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		12.0	20.0		12.0	20.0	
Total Split (s)	37.0	37.0		37.0	37.0		12.0	36.0		17.0	41.0	
Total Split (%)	41.1%	41.1%		41.1%	41.1%		13.3%	40.0%		18.9%	45.6%	
Maximum Green (s)	33.0	33.0		33.0	33.0		8.0	31.0		13.0	36.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	5.0		4.0	5.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.7	2.7		2.7	2.7		3.0	3.2		3.0	3.2	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		32.3			32.3		35.4	27.3		44.9	41.8	
Actuated g/C Ratio		0.38			0.38		0.42	0.32		0.53	0.49	
v/c Ratio		0.16			0.95		0.06	0.88		0.78	0.77	
Control Delay		16.6			52.3		10.5	43.5		29.6	25.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		16.6			52.3		10.5	43.5		29.6	25.9	
LOS		B			D		B	D		C	C	
Approach Delay		16.6			52.3			42.5			27.0	
Approach LOS		B			D			D			C	

Lanes, Volumes, Timings
 1: Rocky Ridge Rd & Dolly Ridge Rd

2019 School PM with Short Term Improvements

04/17/2019

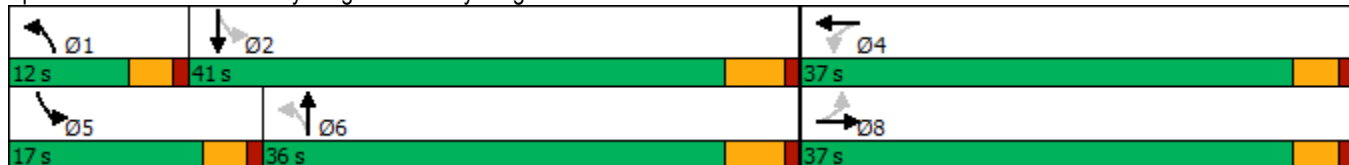


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		36			361		9	375		123	383	
Fuel Used(gal)		1			9		0	7		3	6	
CO Emissions (g/hr)		37			646		7	481		178	424	
NOx Emissions (g/hr)		7			126		1	94		35	82	
VOC Emissions (g/hr)		9			150		2	111		41	98	
Dilemma Vehicles (#)		0			24		0	0		0	0	
Queue Length 50th (ft)		27			277		4	250		87	276	
Queue Length 95th (ft)		49			#478		13	#401		128	405	
Internal Link Dist (ft)		201			322			152			191	
Turn Bay Length (ft)							75					
Base Capacity (vph)		567			594		310	668		391	918	
Starvation Cap Reductn		0			0		0	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		0.16			0.92		0.05	0.77		0.76	0.76	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	85.3
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.95
Intersection Signal Delay:	36.8
Intersection LOS:	D
Intersection Capacity Utilization:	83.0%
ICU Level of Service:	E
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 1: Rocky Ridge Rd & Dolly Ridge Rd



Appendix C – Level of Service Description

Levels of Service Signalized Intersections

Level of service criteria for signalized intersections is defined in terms of *delay*. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period.

Level of service A describes operations with very low delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level of service B describes operations with delay in the range of > 10 to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level of service C describes operations with delay in the range of > 20 to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level of service D describes operations with delay in the range of > 35 to 55 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high vehicle/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of service E describes operations with delay in the range of > 55 to 80 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high vehicle/capacity ratios. Individual cycle failures are frequent occurrences.

Level of service F describes operations with delay in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

**Levels of Service
Unsignalized Intersections**

Level of service criteria for unsignalized intersections is stated in terms of average control delay. Control delay is defined as the total elapsed time from a vehicle joining the queue until its departure from the stopped position at the head of the queue. The criteria for each level of service are cited in the table below.

Level of Service	Average Control Delay (seconds/vehicle)
A	0 - 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

**Levels of Service
Daily Volume**

The criteria for daily level of service are derived from ALDOT defined roadway capacities for urban 2-lane and 3-lane arterials and are cited in the table below.

Level of Service	Daily Service Volume	
	2-lane	3-lane
A	6,500	8,200
B	9,400	11,600
C	11,600	14,400
D	14,000	17,500
E	18,700	23,300
F	> 18,700	> 23,300

Appendix D – Trip Generation Methodology



Trip Generation Methodology

The following information outlines the steps taken to perform trip generation analysis for the intersections of Dolly Ridge Road at Gresham:

- Collected count data at Dolly Ridge Road and Gresham Drive intersection on February 6, 2019. Received counts performed by Jefferson County at Rocky Ridge Road and Dolly Ridge Road intersection on January 15, 2019.
- Compiled ingress and egress traffic volumes from the 2013-2014 school year at Cahaba Heights Elementary.
- Compiled data from the Vestavia Hills City Schools website including the following:
 - Cahaba Heights Elementary School enrollment from 2014-2018
 - Dolly Ridge Elementary School estimated enrollment for 2019-2020
- Calculated average annual growth for Cahaba Heights Elementary School from 2014 through the estimated enrollment for 2019-2020 school year. Used the average annual growth rate for Cahaba Heights Elementary School to back-calculate an estimated enrollment for the 2013-2014 school year.
- Calculated a trip per student rate at Cahaba Heights Elementary for ingress and egress. Applied the trip per student rate from Cahaba Heights Elementary to the new Dolly Ridge Elementary School estimated enrollment for 2019-2020.
- Used the *ITE Trip Generation Manual* Land Use Code 210 to estimate the trips generated by the residential homes behind the new Dolly Ridge Elementary School.
- Cleared the Gresham Drive leg of all traffic volume and replaced it with volumes from the trip generation for Dolly Ridge Elementary and the residential homes.
- The following distributions were developed for school-related traffic at the intersection of Dolly Ridge Road and Gresham Drive:
 - AM Ingress (Gresham Drive northbound): 92% left turn from Dolly Ridge Road eastbound, 8% right turn from Dolly Ridge Road westbound (based on shortest path for population distribution zoned for Dolly Ridge Elementary)
 - AM Egress (Gresham Drive southbound): 67% right turn onto Dolly Ridge Road westbound, 33% left turn onto Dolly Ridge Road eastbound (estimate based on the assumption that a certain percentage will trip-chain and commute downtown via the 280 corridor)
 - PM Ingress (Gresham Drive northbound): Inverse of the AM Egress.
 - PM Egress (Gresham Drive southbound): 80% right turn onto Dolly Ridge Road westbound, 20% left turn onto Dolly Ridge Road eastbound (based on the inverse of the AM Ingress with added cushion for trip-chaining to after school activities)



- Distributions for the residential trips generated can be found in Appendix D.
- Applied all generated trips to the appropriate distributions to calculate estimated turning movement volumes once the new Dolly Ridge Elementary opens for the 2019-2020 school year.

The following information outlines the steps taken to perform trip generation analysis for the intersection of Rocky Ridge Road at Dolly Ridge Road:

- Performed a shortest path analysis on the population zoned for Dolly Ridge Elementary to estimate the percentage of traffic arriving at the intersection from each direction. Applied estimated percentages to calculate an estimated amount of trips coming from each direction at the intersection.
- Removed the equivalent volume from the intersection based on the existing left turn volume from Dolly Ridge Road to Gresham Drive and the existing right turn volume from Gresham Drive to Dolly Ridge Road. Volumes were removed based on the distribution of existing traffic at the intersection from each direction.
- Added estimated amount of trips to each approach based on the current turning movement volume distributions for AM and PM ingress and egress.

Vestavia Hills, AL
SA# 18-0337

		Student Trip Rate		per student enrolled
		Ingress	Egress	
School	AM	0.94	0.75	
	PM	0.41	0.50	

		Directional Distribution		per dwelling
		Entering	Exiting	
Residential	AM	25%	75%	
	PM	63%	37%	

Trip Generation Estimate

Dolly Ridge Elementary - AM Dropoff
Dolly Ridge Elementary - PM Pickup

	Students	PEAK HOURS		ITE LUC Code
		In	Out	
735 students	735	688	550	None
	735	302	368	None
15 homes	Weekday	In	Out	210
	15	3	11	
Homes behind Gresham - School PM	16	10	5	210

Peak-Hour Intercept Trip Rates

Dolly Ridge Elementary

	AM Peak	PM Peak
Dolly Ridge Elementary	0%	0%
	0%	0%

Adjusted AM Peak Hour Trips

Dolly Ridge Elementary
Residential

		IN		OUT	
		Total	New	Total	New
735 students		688	688	550	550
15 homes		15	3	-	11
-		-	-	-	-
-		-	-	-	-
Totals		703	691	550	561

Adjusted PM Peak Hour Trips

Dolly Ridge Elementary
Residential

		IN		OUT	
		Total	New	Total	New
735 students		302	302	368	368
15 homes		16	10	16	5
-		0	0	0	0
-		0	0	0	0
Totals		318	312	384	373

Year	Total Vestavia Hills School District Enrollment	Cahaba Heights Elem. Enrollment	Growth	Percent Growth	Data Type
2013-14	6701	357			Measured
2014-15	6760	379			Measured
2015-16	7014	401	22	5.80%	Measured
2016-17	7083	421	20	4.99%	Measured
2017-18	7192	466	45	10.69%	Measured
2018-19		469	3	0.64%	Projected
2019-20		491	22	4.69%	Projected

Source: Annual Report
Source: Annual Report
Source: Annual Report
Source: Annual Report
Source: Annual Report
Source: VH Schools Website
Source: VH Schools Website

Cahaba Heights Elementary Volume Data (2013-14 School Year)		
	Ingress	Egress
AM	334	267
PM	147	179

Trips Per Student - Rate		
	Ingress	Egress
AM	0.94	0.75
PM	0.41	0.50

Annual Avg. Growth 1.8% 5.9% Calculated Used 5.9% to back-calculate CHE 2013-14 Enrollment

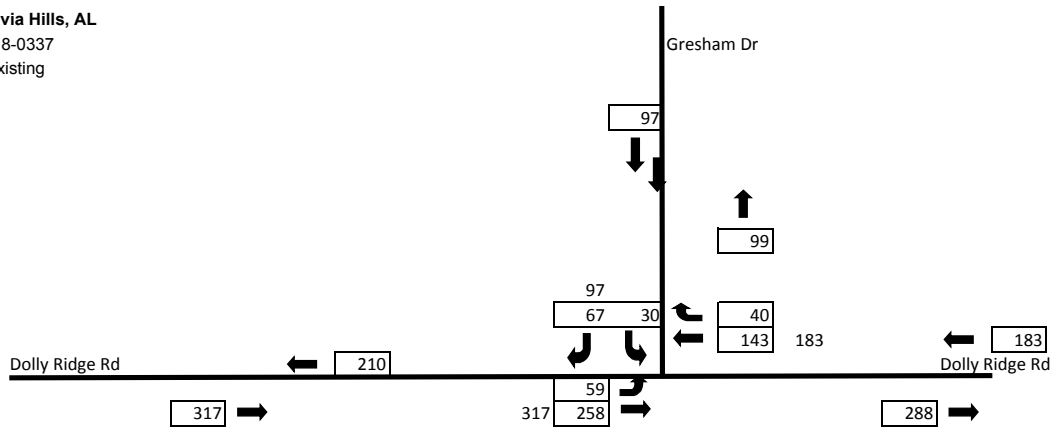
2014-15 to 2017-18 average annual growth at CH Elem. 7.7% Calculated

Year	Total High School Enrollment	Estimated Freshmen	Measured Seniors	Staff
2013-14				
2014-15	1901	475		
2015-16	1970	493		
2016-17	2023	506		
2017-18	2012	503	509	243
2018-19	2025	506		
2019-20	2058	515		
2020-2021	2092	523		

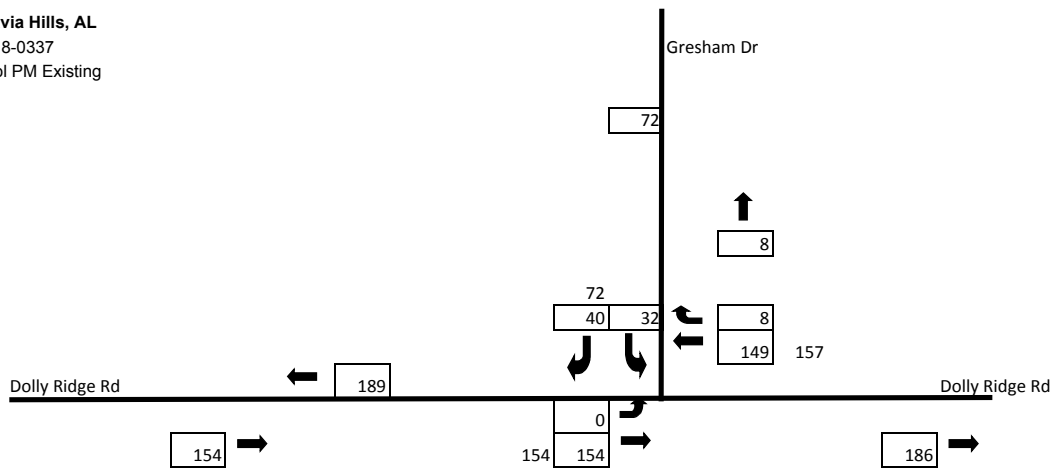
Source: Annual Report
Source: Annual Report
Source: Annual Report
Source: Annual Report
Source: Annual Report
Source: VH Schools Website
Calculated based on data above
Calculated based on data above

Avg. Annual Growth 1.6%

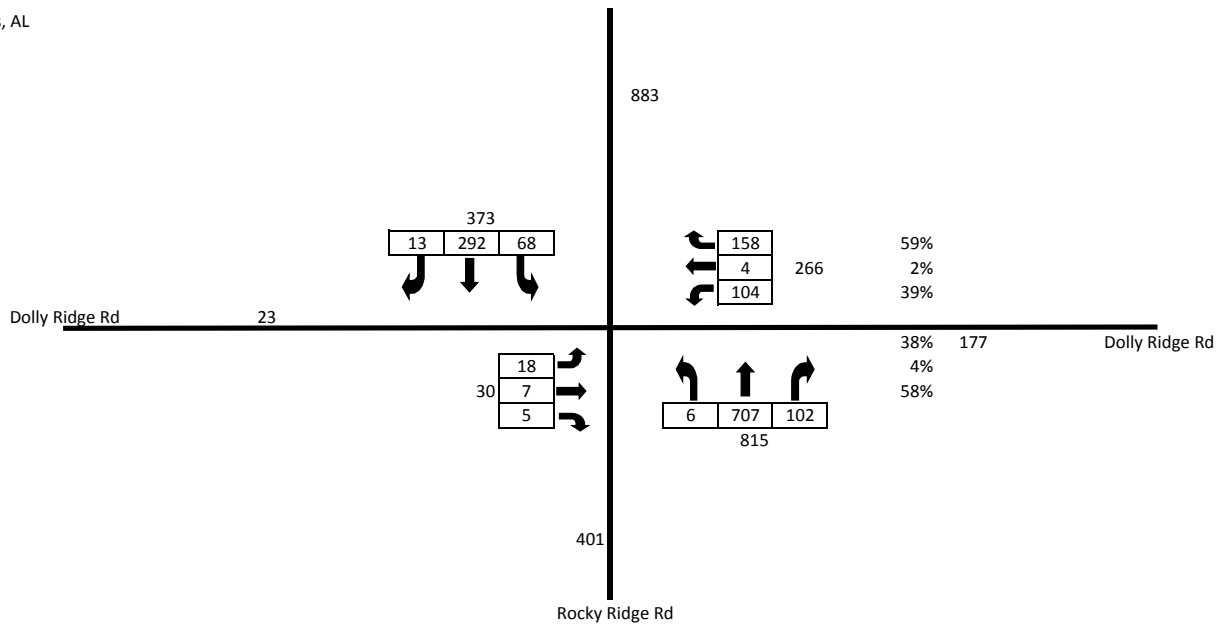
Vestavia Hills, AL
SA# 18-0337
AM Existing



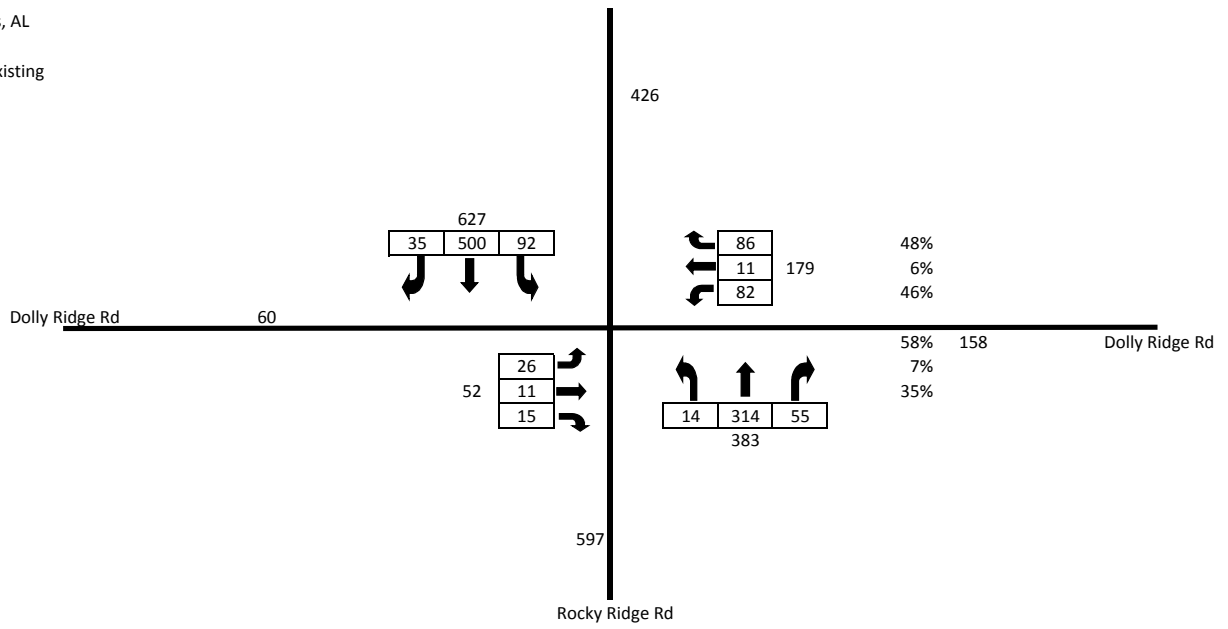
Vestavia Hills, AL
SA# 18-0337
School PM Existing



Vestavia Hills, AL
 SA# 18-0337
 AM Existing

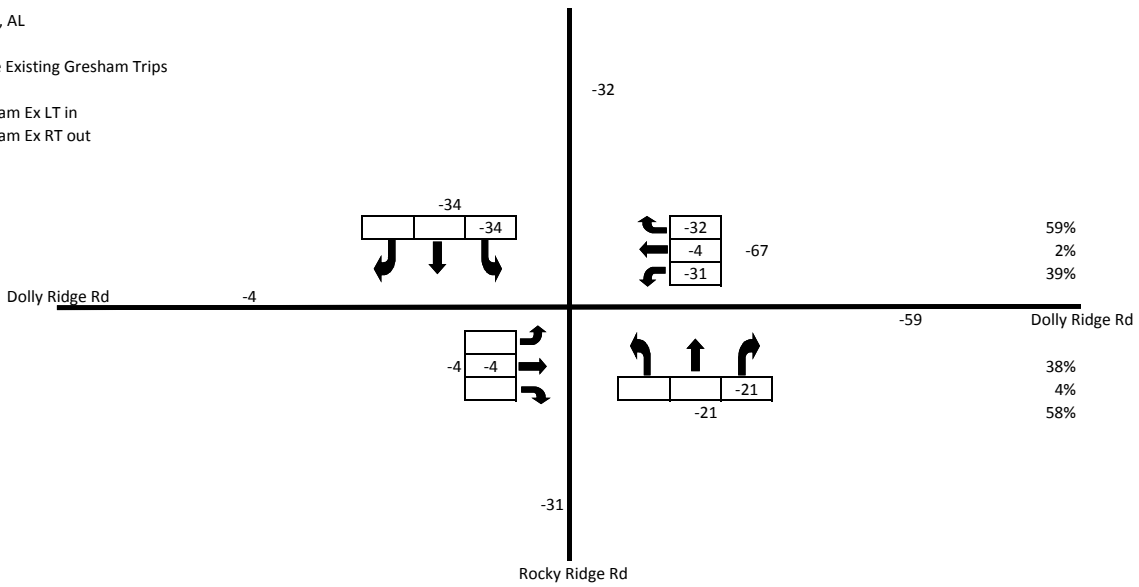


Vestavia Hills, AL
 SA# 18-0337
 School PM Existing



Vestavia Hills, AL
 SA# 18-0337
 AM - Remove Existing Gresham Trips

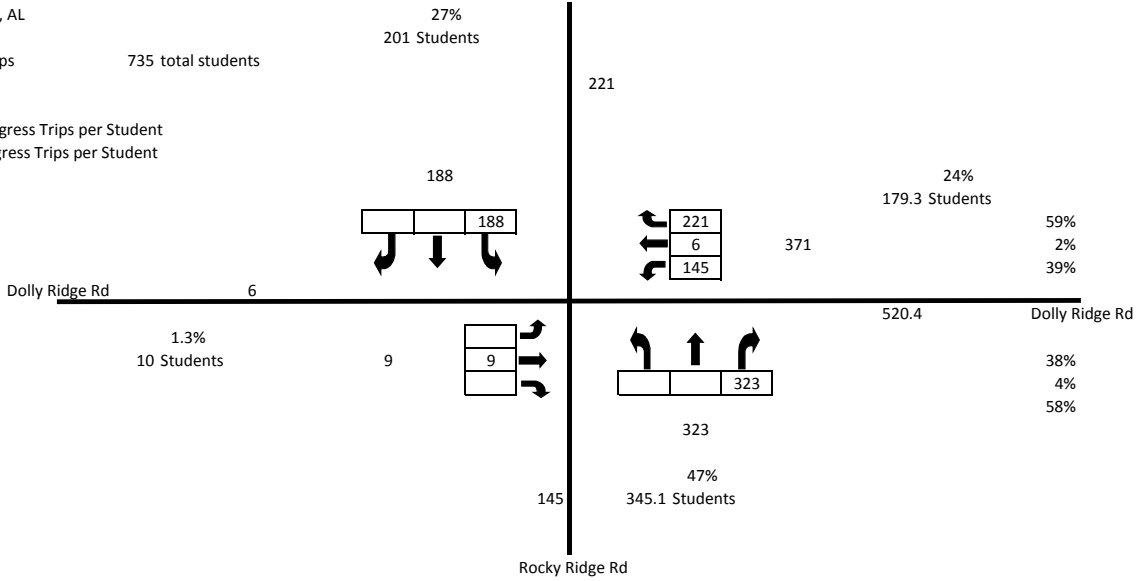
59 Gresham Ex LT in
 67 Gresham Ex RT out



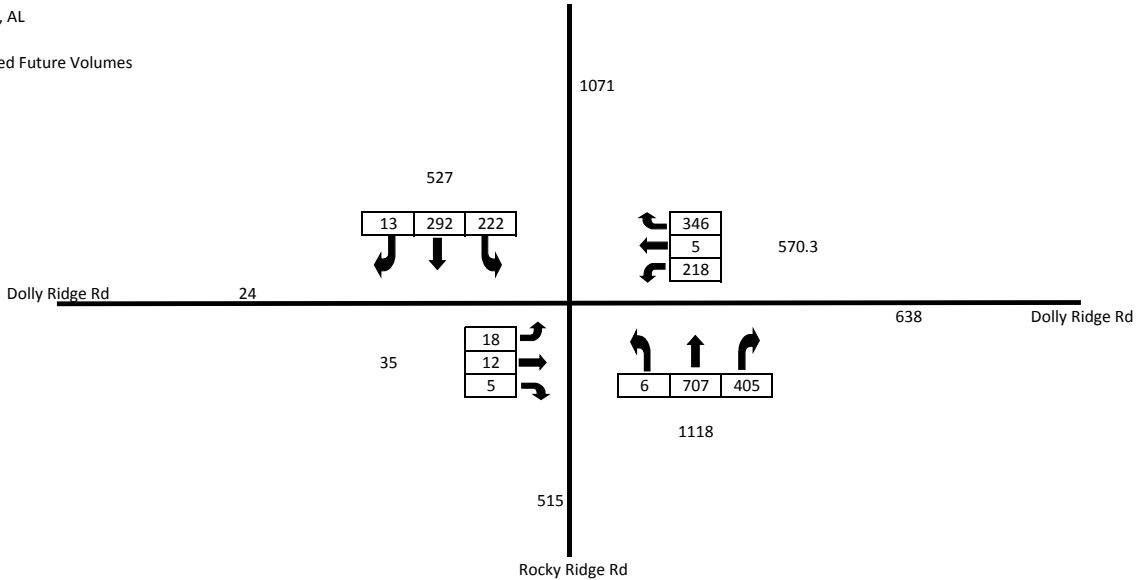
Vestavia Hills, AL
 SA# 18-0337
 AM - New Trips

735 total students

0.94 AM Ingress Trips per Student
 0.75 AM Egress Trips per Student

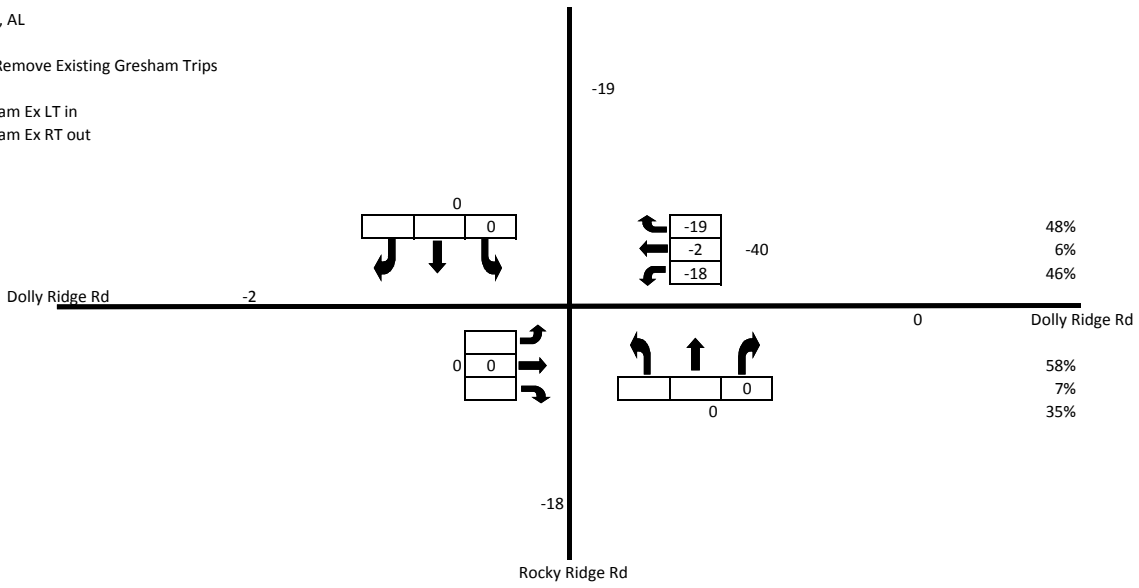


Vestavia Hills, AL
 SA# 18-0337
 AM - Estimated Future Volumes



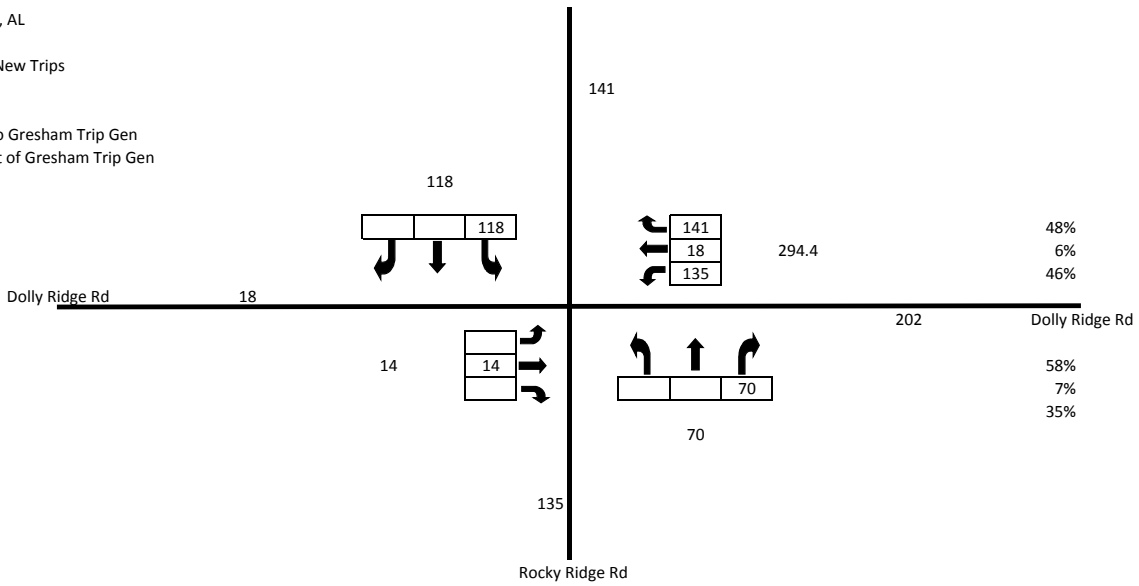
Vestavia Hills, AL
 SA# 18-0337
 School PM - Remove Existing Gresham Trips

0 Gresham Ex LT in
 40 Gresham Ex RT out

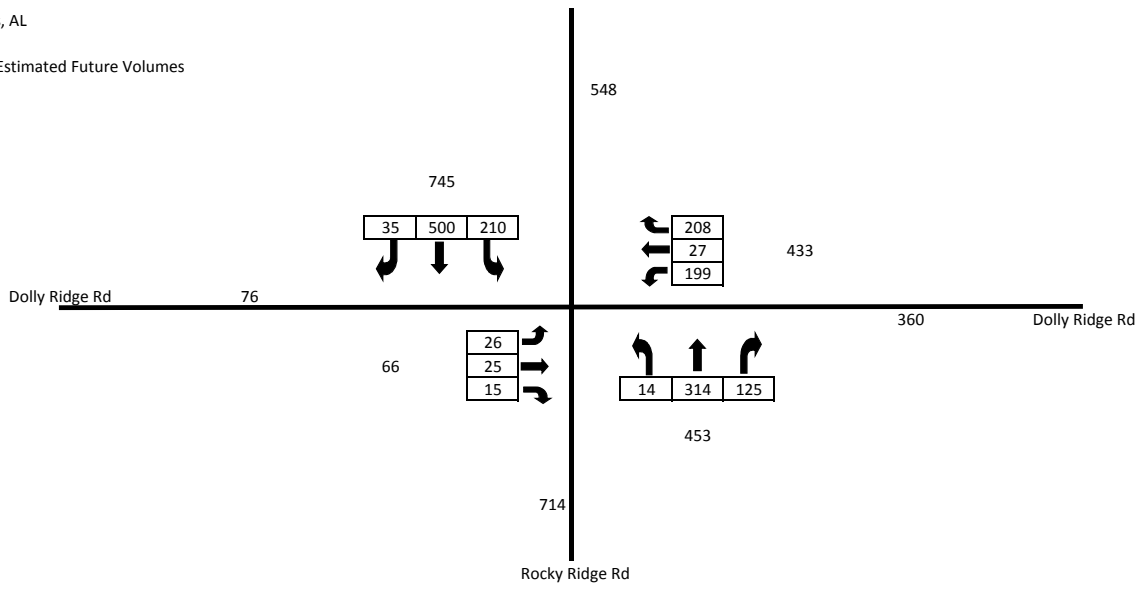


Vestavia Hills, AL
 SA# 18-0337
 School PM - New Trips

202 LT into Gresham Trip Gen
 294 RT out of Gresham Trip Gen



Vestavia Hills, AL
SA# 18-0337
School PM - Estimated Future Volumes

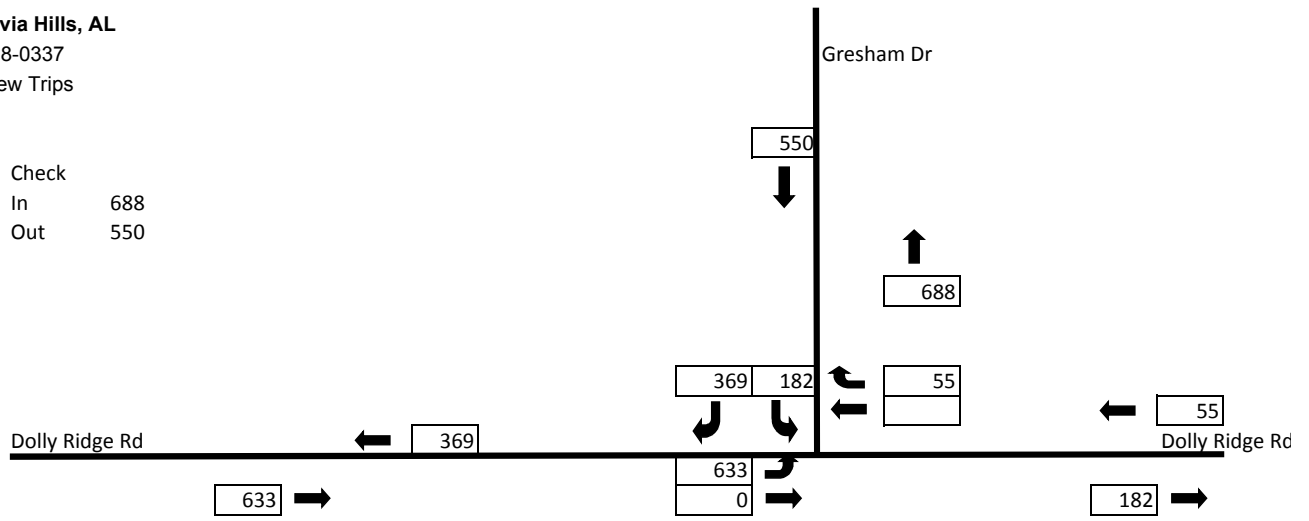


Vestavia Hills, AL

SA# 18-0337

AM New Trips

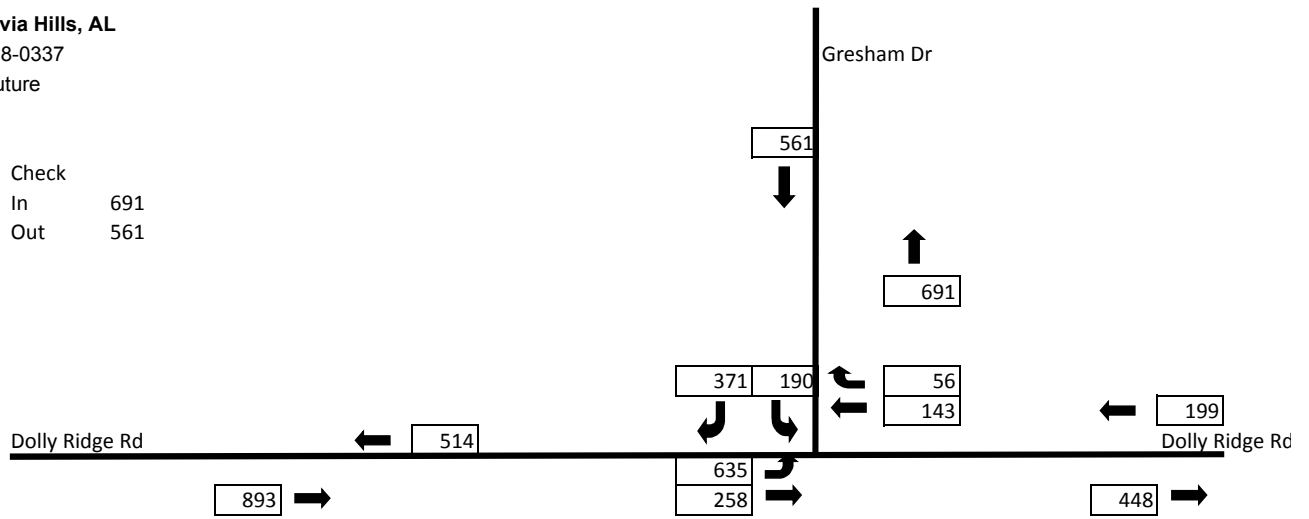
Check
In 688
Out 550



In 688
Out 550

Vestavia Hills, AL
 SA# 18-0337
 AM Future

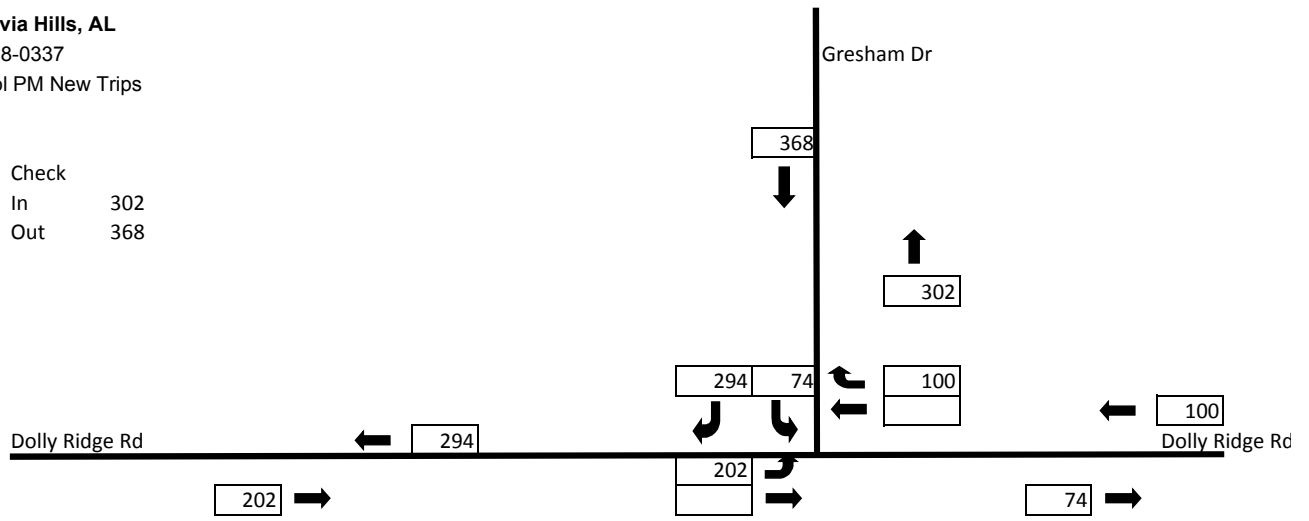
Check
 In 691
 Out 561



New In 688
 New Out 550
 Res In 3
 Res Out 11
 Total In 691
 Total Out 561

Vestavia Hills, AL
 SA# 18-0337
 School PM New Trips

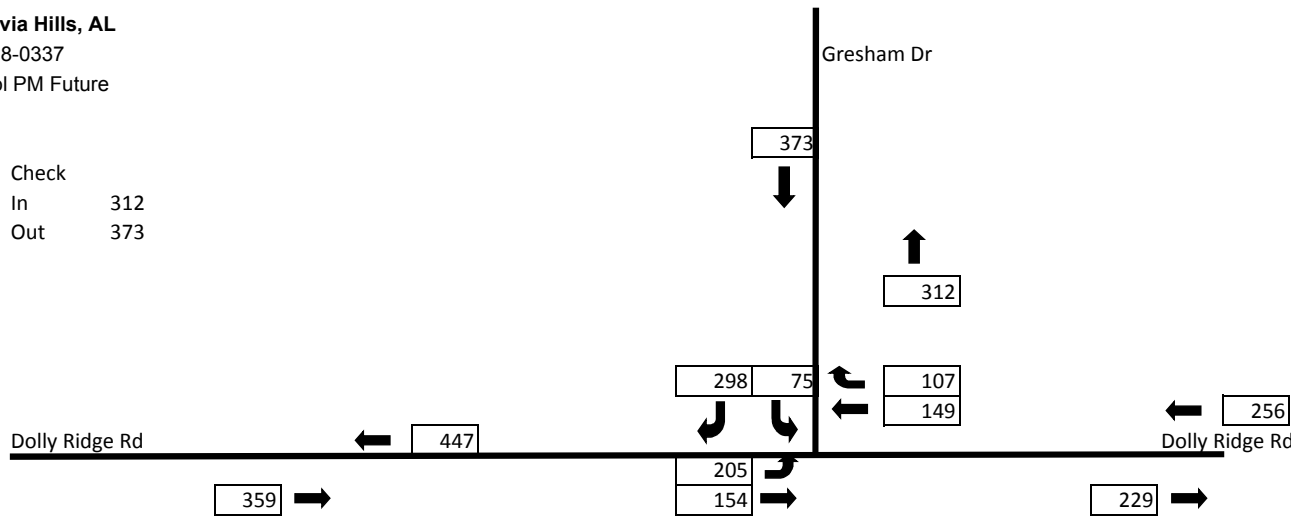
Check
 In 302
 Out 368



In 302
 Out 368

Vestavia Hills, AL
 SA# 18-0337
 School PM Future

Check
 In 312
 Out 373



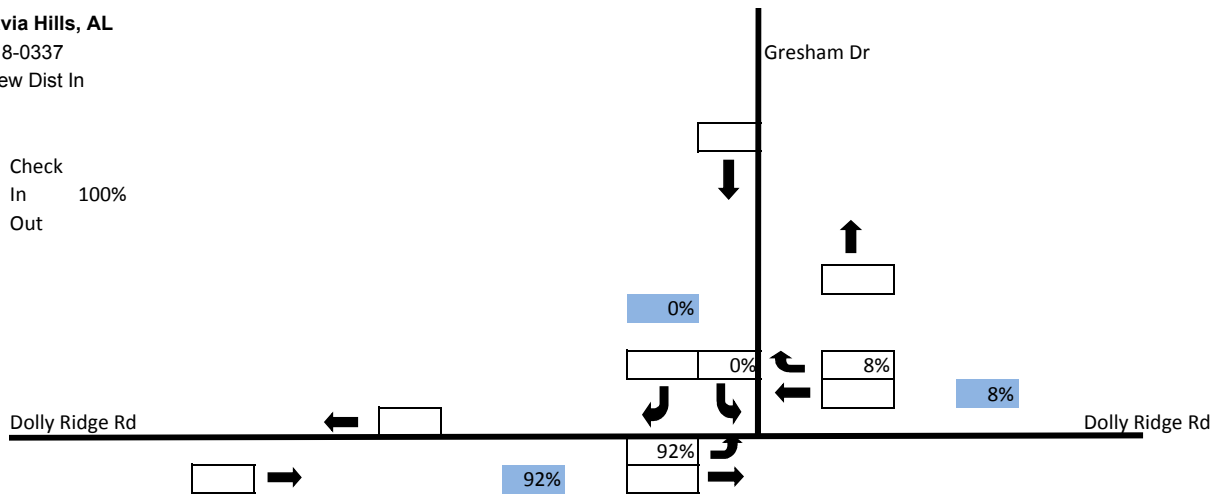
New In 302
 New Out 368

Res In 10
 Res Out 5

Total In 312
 Total Out 373

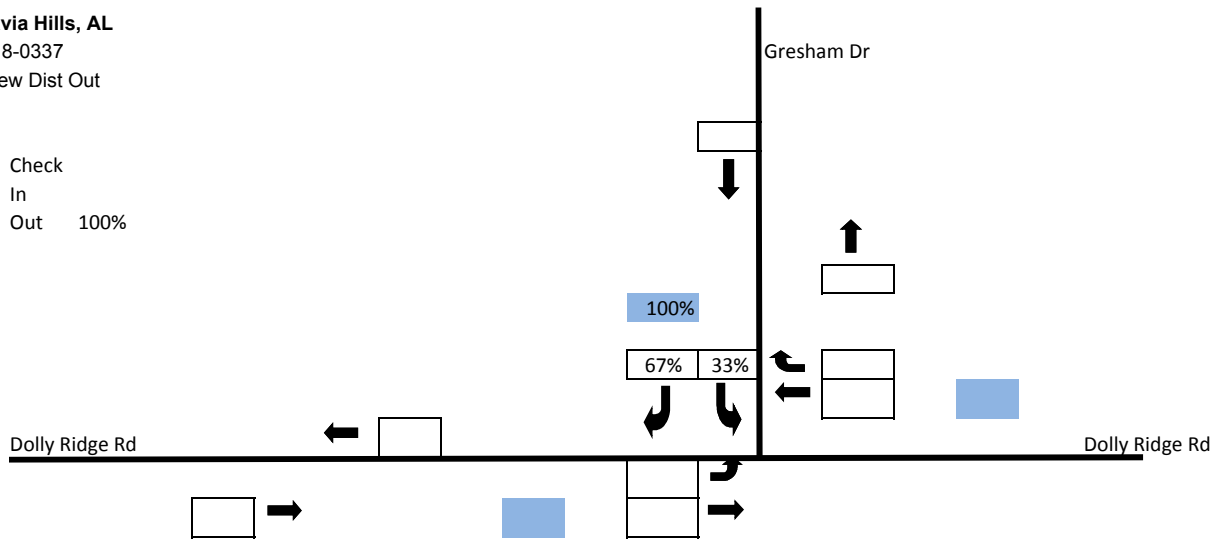
Vestavia Hills, AL
 SA# 18-0337
 AM New Dist In

Check
 In 100%
 Out



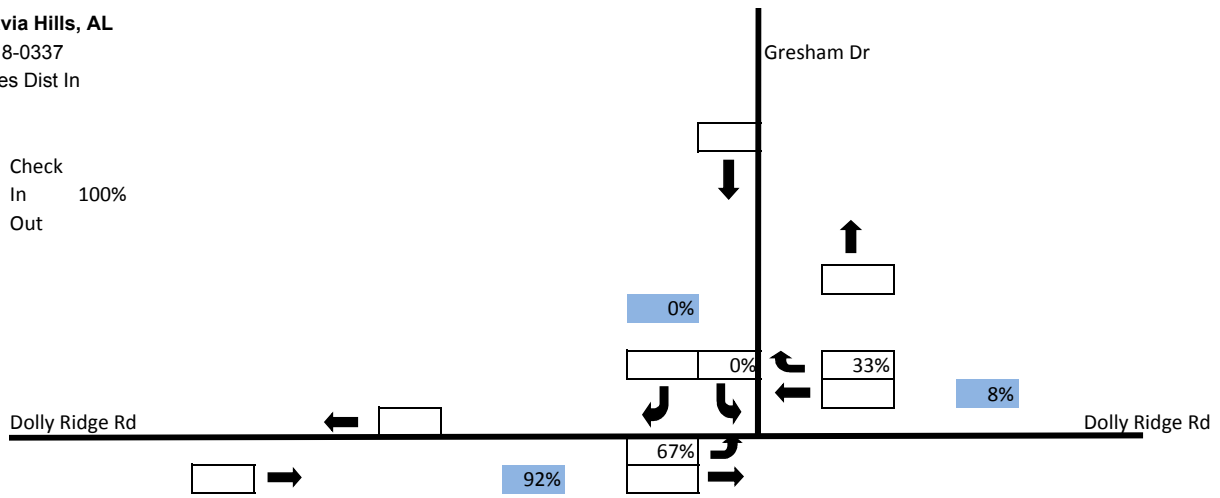
Vestavia Hills, AL
 SA# 18-0337
 AM New Dist Out

Check
 In
 Out 100%



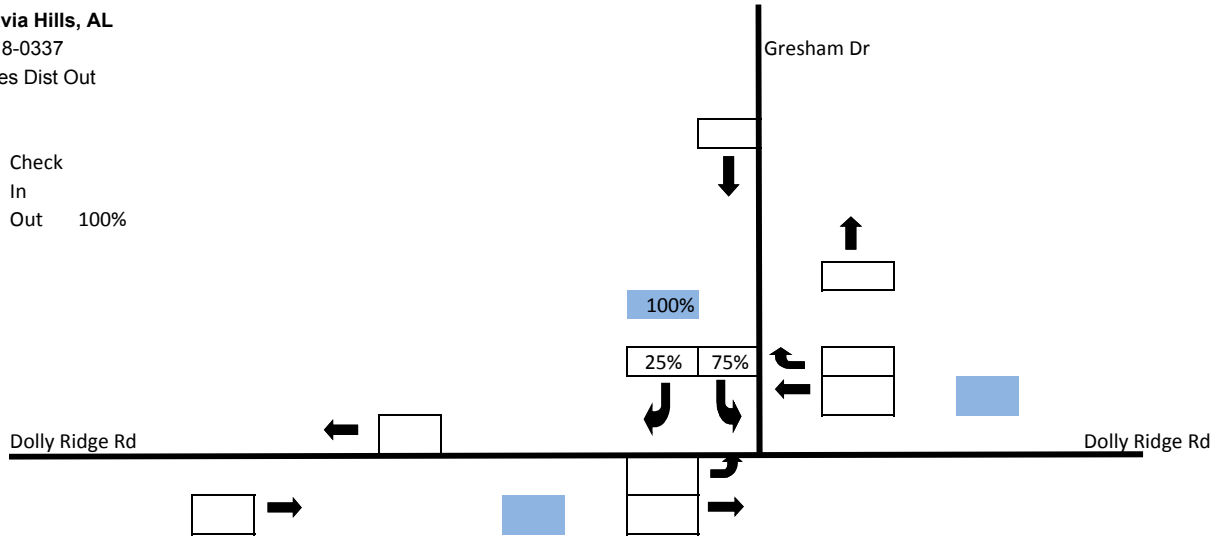
Vestavia Hills, AL
SA# 18-0337
AM Res Dist In

Check
In 100%
Out



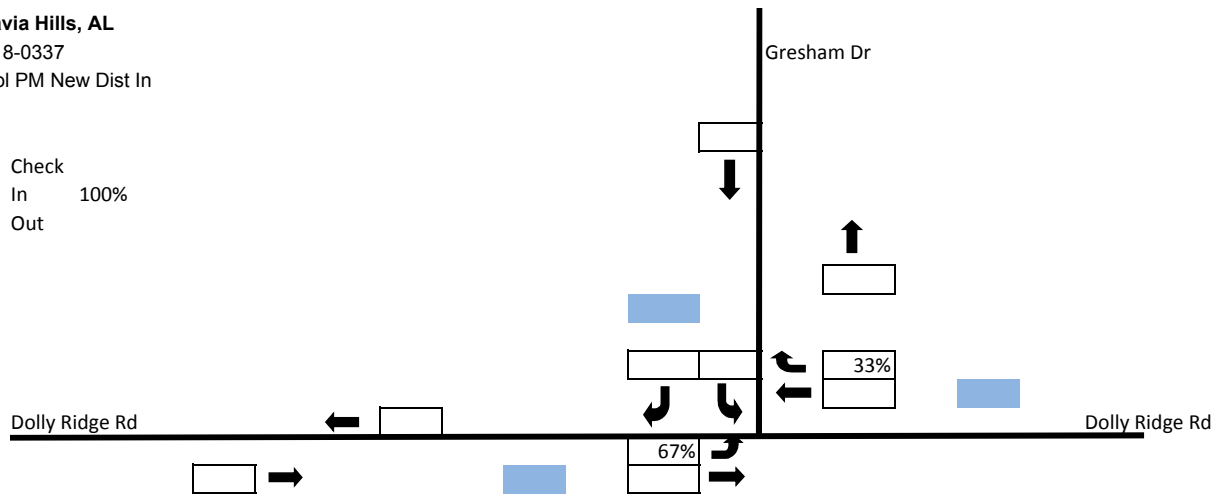
Vestavia Hills, AL
SA# 18-0337
AM Res Dist Out

Check
In
Out 100%



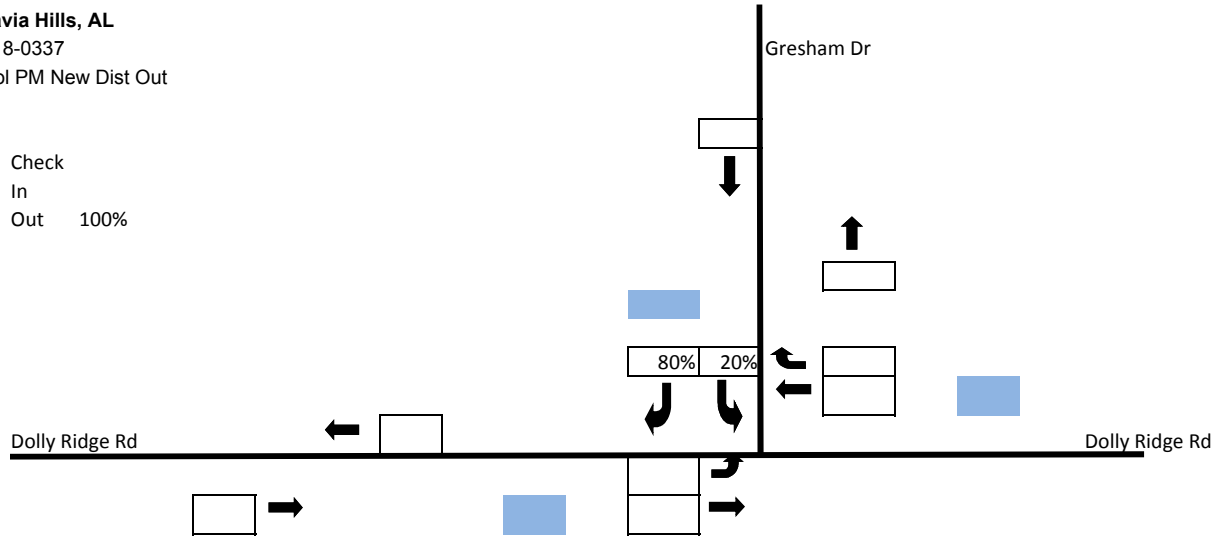
Vestavia Hills, AL
SA# 18-0337
School PM New Dist In

Check
In 100%
Out



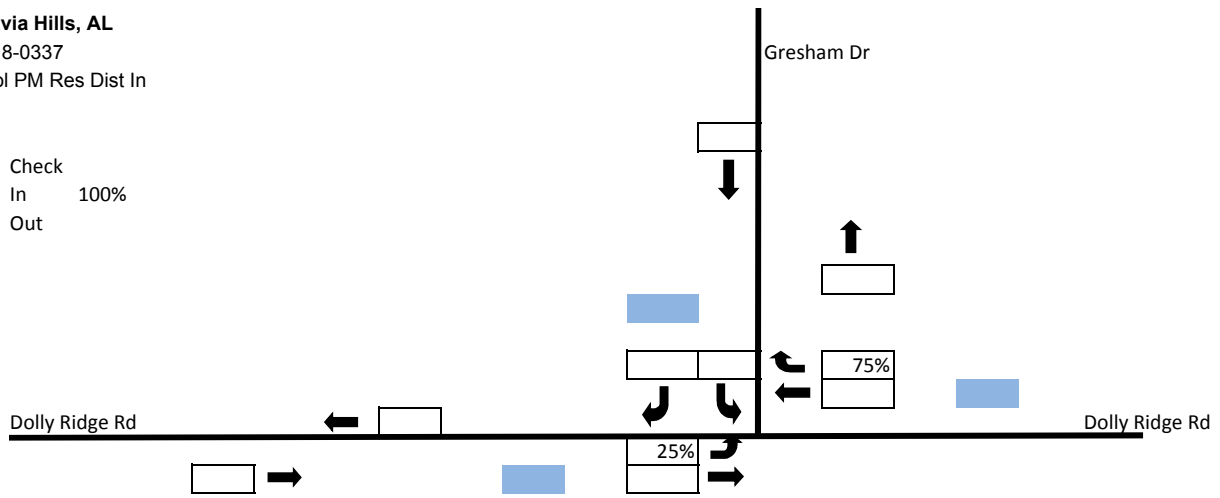
Vestavia Hills, AL
SA# 18-0337
School PM New Dist Out

Check
In
Out 100%



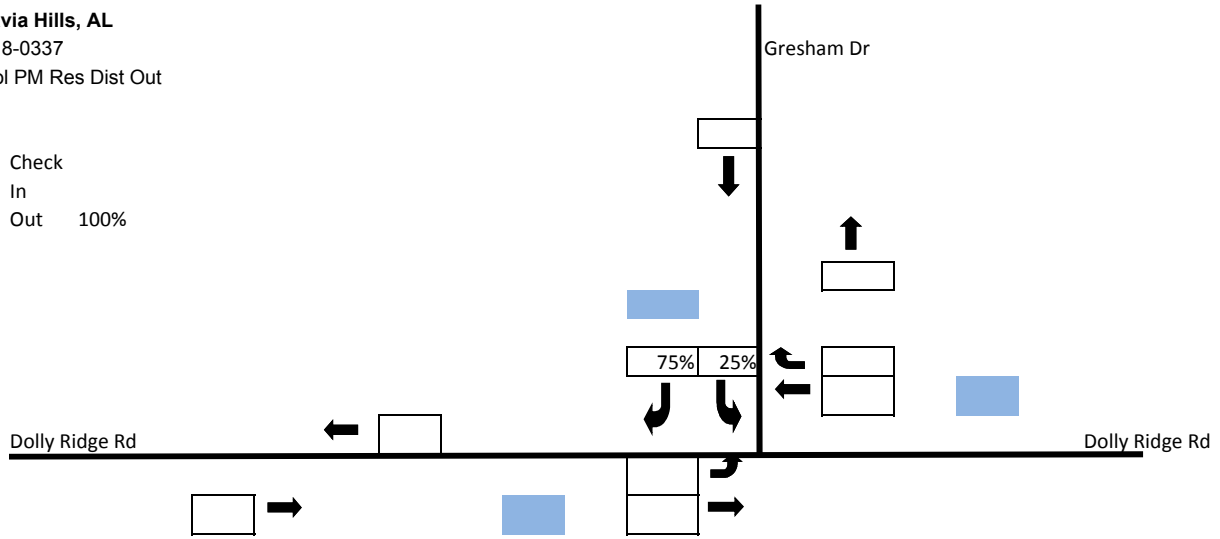
Vestavia Hills, AL
SA# 18-0337
School PM Res Dist In

Check
In 100%
Out



Vestavia Hills, AL
SA# 18-0337
School PM Res Dist Out

Check
In
Out 100%



Appendix E – Base Signal Timings

Appendix F – Signal Warrant Analysis Reports

TRAFFIC SIGNAL WARRANTS

City/Town: **Vestavia Hills**
 County: **Jefferson**
 Division: **RPCGB**
 Data Date: **2/6/2019**
 Major Route: **Blue Lake Drive**
 Minor Route: **Sicard Hollow Road**

Analysis Performed By: **DC**
 Date Analysis Performed: **2/26/2019**
 Project Number if Applicable: **180337**
 Weather Conditions: **Showers**
 Apr. Lanes: **1** Critical Approach Speed (mph): **35**
 Apr. Lanes: **1**

Volume Level Criteria

1. Is the critical speed of major street traffic > 70 km/h (40 mph) ? Yes No
 2. Is the intersection in a built-up area or isolated community of <10,000 population? Yes No
 If Question 1 or 2 above is answered "Yes", then use "70%" volume level 70% 100%

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

Warrant 1 is satisfied if Condition A or Condition B is "100%" satisfied. Satisfied: Yes No

Warrant is also satisfied if both Condition A and Condition B are "80%" satisfied, given adequate trials of other remedial measures have been tried.

Adequate trial(s) of other remedial measures tried: Yes No

List Remedial Measures Tried (Required for 80% Combination of A & B)

Condition A - Minimum Vehicular Volume & Condition B - Interruption of Continuous Traffic

100% Satisfied: Yes No

(Used if neither Condition A or B is satisfied) 80% Satisfied: Yes No

		(volumes in veh/hr)		Minimum Requirements				Eight Highest Hours							
								7 AM	4 PM	5 PM	3 PM	8 AM	6 PM	12 PM	2 PM
		Approach Lanes		1	2 or more										
		Volume Level		100%	70%	100%	70%								
W - 1A	100%	Both Approaches on Major Street		500	350	600	420	991	1,195	1,137	753	634	715	639	603
		Highest Approach on Minor Street		150	105	200	140	423	162	181	236	351	150	115	125
W - 1B	100%	Both Approaches on Major Street		750	525	900	630	991	1,195	1,137	753	634	715	639	603
		Highest Approach on Minor Street		75	53	100	70	423	162	181	236	351	150	115	125
W - 1A	80%	Both Approaches on Major Street		400	280	480	336	991	1,195	1,137	753	634	715	639	603
		Highest Approach on Minor Street		120	84	160	112	423	162	181	236	351	150	115	125
W - 1B	80%	Both Approaches on Major Street		600	420	720	504	991	1,195	1,137	753	634	715	639	603
		Highest Approach on Minor Street		60	42	80	56	423	162	181	236	351	150	115	125

TRAFFIC SIGNAL WARRANTS

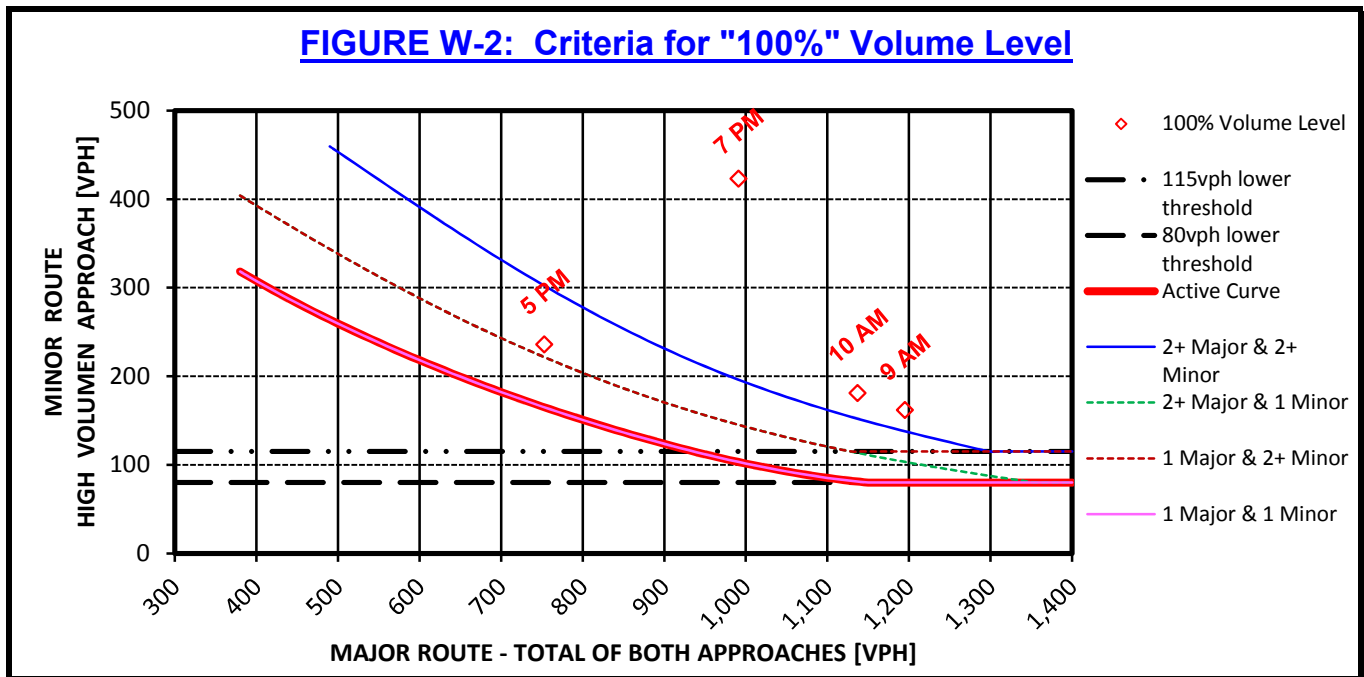
WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME

Satisfied: Yes No

If all four points lie above the appropriate line, then this warrant is satisfied.

	Four Highest Hours			
	7 PM	9 AM	10 AM	5 PM
(Volumes in veh/hr)				
SUM of Both Approaches on Major Street	991	1,195	1,137	753
Highest Minor Street Approach	423	162	181	236

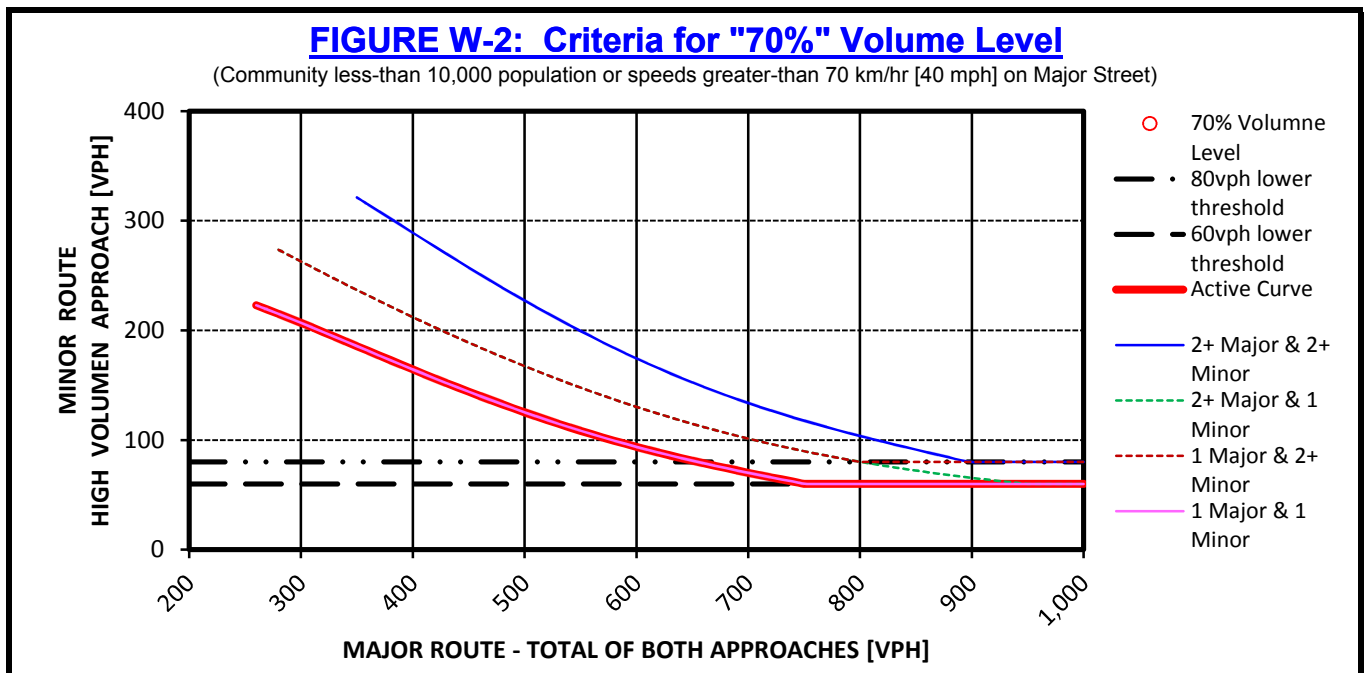
FIGURE W-2: Criteria for "100%" Volume Level



** Note: 115 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 80 vph applies as the lower threshold volume threshold for a minor route approach with one lane.*

FIGURE W-2: Criteria for "70%" Volume Level

(Community less-than 10,000 population or speeds greater-than 70 km/hr [40 mph] on Major Street)



** Note: 80 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 60 vph applies as the lower threshold volume threshold for a minor route approach with one lane.*

TRAFFIC SIGNAL WARRANTS

WARRANT 3 - PEAK HOUR VEHICULAR VOLUME

This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time period.

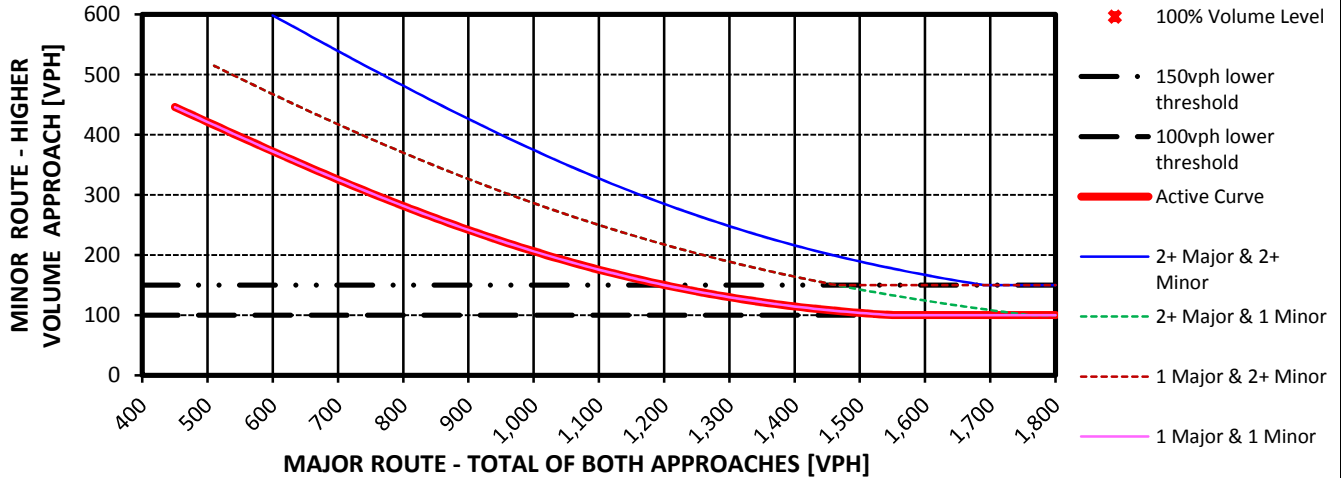
Applicable: Yes No
 Satisfied: Yes No

Signalization shall be considered if a point lies above the appropriate line or the Delay criteria is met.

Unusual case(s) justifying this Warrant:

Peak Hour Data		
Peak Hour	Major Route	Minor Route

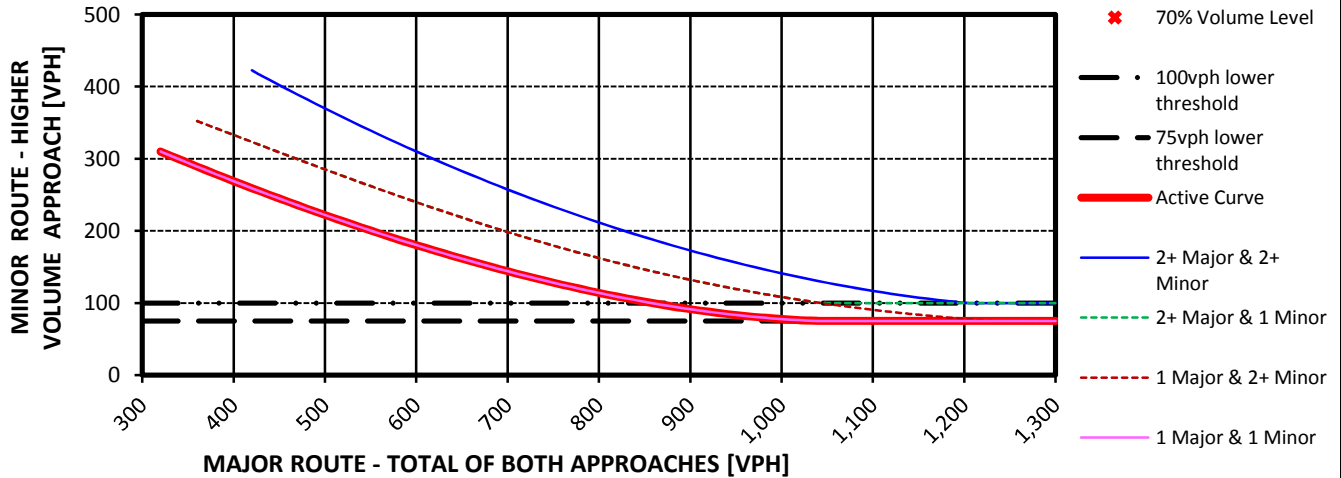
FIGURE W-3: Criteria for "100%" Volume Level



* Note: 150 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 100 vph applies as the lower threshold volume threshold for a minor route approach with one lane.

FIGURE W-3: Criteria for "70%" Volume Level

(Community less-than 10,000 population or speeds greater-than 70 km/hr [40 mph] on Major Street)



* Note: 100 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 75 vph applies as the lower threshold volume threshold for a minor route approach with one lane.

DELAY CRITERIA	1. Delay on Minor Approach (vehicle-hours)				2. Volume on Minor Approach (veh/hr)				3. Total Entering Volume (veh/hr)			
	Approaches		Lanes		Approaches		Lanes		Number of Approaches		Volume Criteria	
	Approaches	1	2	Approaches	1	2	No. of Approaches	3	4	No. of Approaches	3	4
	Delay Criteria:	4.0	5.0	Volume Criteria	100	150	Volume Criteria	650	800	Volume Criteria	650	800
Delay:			Volume:			Volume:			Volume:			
Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	

TRAFFIC SIGNAL WARRANTS

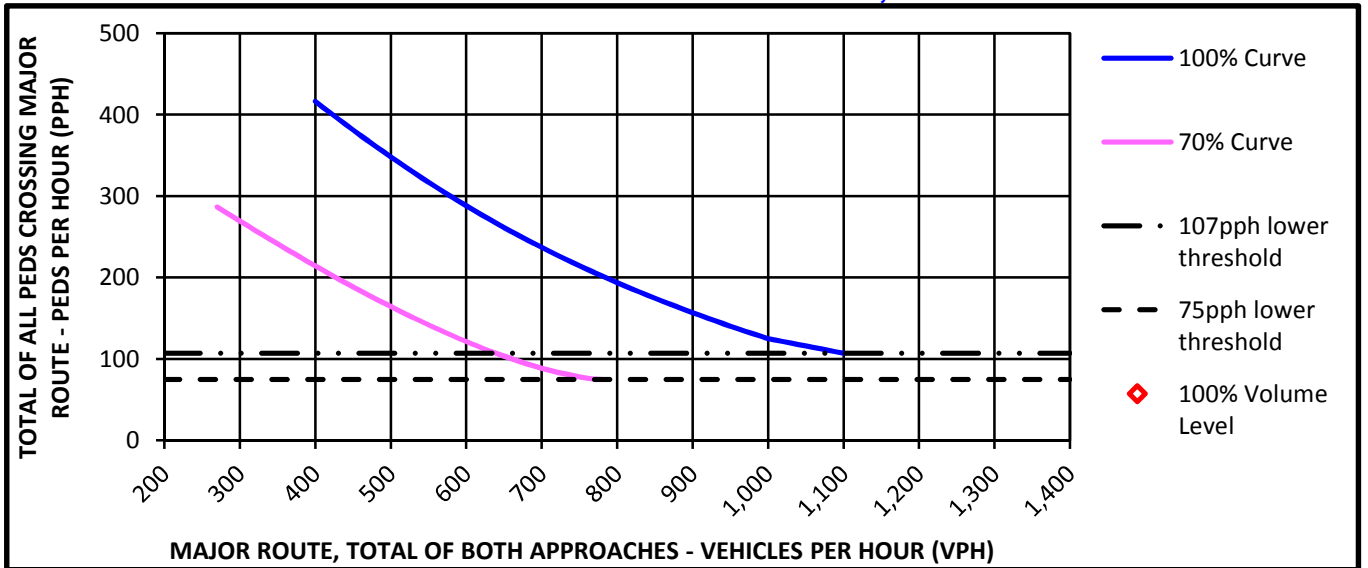
WARRANT 4 - PEDESTRIAN VOLUME

Satisfied: Yes No

Pedestrian Signal Location Criteria		Fulfilled?	
		Yes	No
The nearest traffic control device (signal or STOP sign) controlling traffic on the major route is more than 90m (300 ft) away:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		X
If no above, will this proposed signal restrict the progressive movement of traffic?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

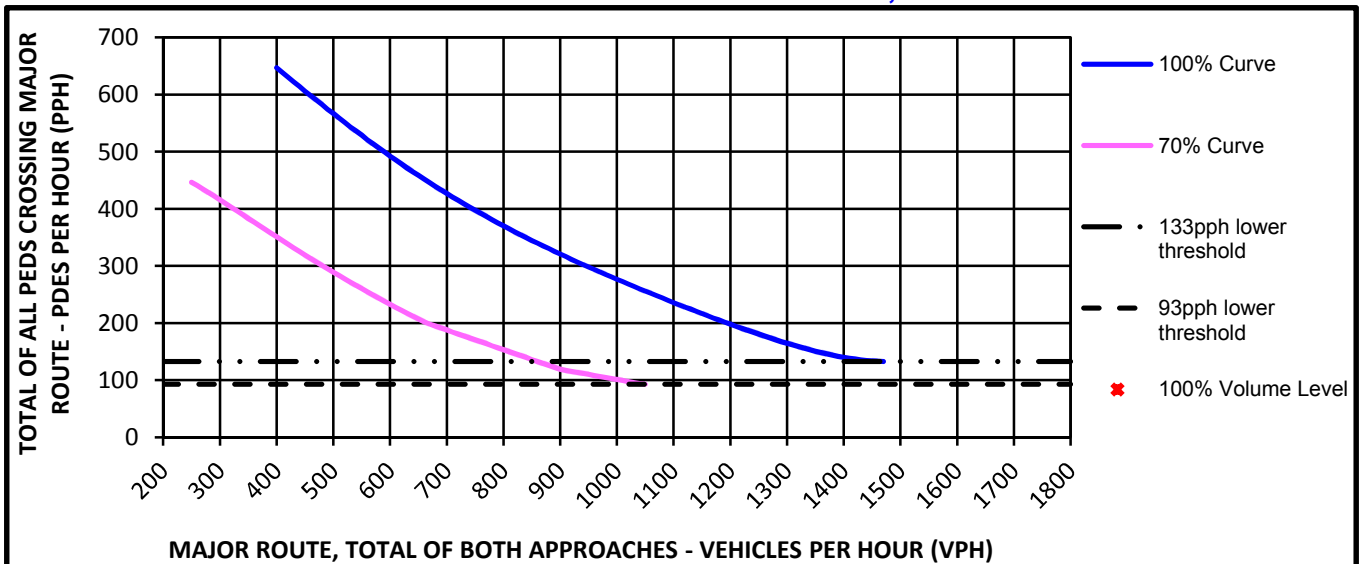
Vehicle volumes in veh/hr and Pedestrian volumes in ped/hr	Four Greatest Hours				Peak Hour
SUM of Both Approaches on Major Route					
Pedestrians crossing the Major Route					

FIGURE W-4a: Criteria for 100% Volume Level, Four-Hour Volumes



* Note: 107 pph applies as the lower threshold volume for the 100% Volume Level.
75 pph applies as the lower threshold volume for the 70% Volume Level.

FIGURE W-4b: Criteria for 100% Volume Level, Peak Hour Volume



* Note: 133 pph applies as the lower threshold volume for the 100% Volume Level.
93 pph applies as the lower threshold volume for the 70% Volume Level.

TRAFFIC SIGNAL WARRANTS

WARRANT 5 - SCHOOL CROSSING

Satisfied: Yes No

This warrant is intended for application where the fact that schoolchildren crossing the major route is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students. This warrant is satisfied if all three of the criteria below are fulfilled after remedial measures have been considered.

Any remedial measures implemented in or around the intersection to improve the safety of the students as noted in Section **4C.06 Warrant 5, School Crossing** in the MUTCD:

Criteria			Fulfilled?	
			Yes	No
1. Enter the number of schoolchildren crossing the major route along with the hour this occurs. The hour can be any 60 minute interval (ex 2:15 PM - 3:15 PM enter 2:15 - 3:15). Requires a minimum of 20 schoolchildren during the any hour.	Num. of Students	Highest Crossing Hour Period		X
2. For both the morning (AM) and afternoon (PM) periods of operation, enter the number of adequate gaps observed for each period and the number of minutes each period lasted. Requires one period to operate with fewer gaps than the number of minutes in the period.	AM PM	Period Minutes Gaps		X
3. Is the nearest traffic signal along the major route more than 90m (300 ft) from this crossing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If the signal is within 90m (300 ft) of an existing signalize intersection, will it restrict progressive movement of traffic? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				X

WARRANT 6 - COORDINATED SIGNAL SYSTEM

Satisfied: Yes No

Progressive movement in a coordinated signal system sometimes necessitates the installtion of traffic control signals at intersections that would not otherwise be considered in order to maintain proper platooning of vehicles. This warrant is satisfied if the below criteria is satisfied as follows: criteria 1 is satisfied and either criteria 2 or 3 is satisfied.

Criteria		Fulfilled?	
		Yes	No
1. The inclusion of this proposed signal, into the coordinated system, does not result in a signal spacing of less than 305m (1,000 ft)?			X
a. On a one-way street or a street that has traffic predominantly in one direction, are the adjacent traffic control signals so far apart that they do not provide the necessary degree of vehicluar platooning?			X
2. b. On a two-way street, do adjacent traffic control signals not provide the necessary degree of platooning and will the proposed and adjacent traffic control signals collectively provide a progressive operation?			X

TRAFFIC SIGNAL WARRANTS

WARRANT 7 - CRASH EXPERIENCE

Satisfied: Yes No

This warrant is intended for application where the severity and frequency of crashes are the principal reasons to consider the installation of a traffic control signal. The need for a traffic control signal shall be considered if an engineering study finds that criteria 1, 2, and 3 are met.

Criteria			Fulfilled?	
			Yes	No
1. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency as shown below:				
				X
2. How many crashes within the past 12 months? For this criteria to be met, five or more reported crashes, of types susceptible to correction by the installation of a traffic control signal, must have occurred.				X
3. If Warrant 1A or Warrant 1B are 80 percent satisfied of the current values or if Warrant 4, 4-hour or peak, is met at the 80 percent values.			Met?	
			Yes	No
Warrant 1, Condition A, Minimum Vehicular Volume (80 percent satisfied):				X
Warrant 1, Condition B, Interruption of Continuous Traffic (80 percent satisfied):			X	
Warrant 4, Four-Hour Volume (80 percent satisfied):				X
Warrant 4, Peak Hour Volume (80 percent satisfied):				X
			X	

WARRANT 8 - ROADWAY NETWORK

Satisfied: Yes No

This warrant is used to encourage the concentration and organization of traffic flow on a roadway network. This warrant is satisfied if one of the following 2 criteria is met and both routes meet at least one of the characteristics of a Major Route below.

Criteria			Met?		Fulfilled?	
			Yes	No	Yes	No
1. Both of the criteria to the right are required in order to be met.	a. Please enter the total existing, or immediately projected, entering traffic volume during the peak hour of a typical weekday. Requires a minimum of 1,000 vehicles to be met.	Volume		X		X
	b. Based on an engineering study, does the 5 year projected traffic volumes, for this location, meet one or more of Warrants 1, 2, or 3 during an average weekday? *			X		
2. Enter the total existing, or immediately projected, entering volume for each of any 5 hours of a non-normal business day. (Saturday or Sunday). 1,000 vph for each hour required.				← Hour		X
					← Volume	

* Supporting data required for verification of the projected 5 year traffic Warrants.

A major route, as used in this signal warrant, shall have at least one of the following characteristics:			Met?		Fulfilled?	
Characteristics of Major Routes			Yes	No	Yes	No
1. Is it a part of the street or highway system that serves as the principal roadway network for through traffic flow?	Major Route			X		X
	* Minor Route			X		
2. Does it include rural or suburban highways outside, entering, or traversing a city?	Major Route			X		
	* Minor Route			X		
3. Does it appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study?	Major Route			X		
	* Minor Route			X		

* This is a minor route, but for the purposes of this Warrant, shall be considered as the other major route.

Note: Supporting data shall be required to verify the routes meet one of the characteristics of a major route.

TRAFFIC SIGNAL WARRANTS

WARRANT 9 - INTERSECTION NEAR A GRADE CROSSING

Applicable
 Yes No

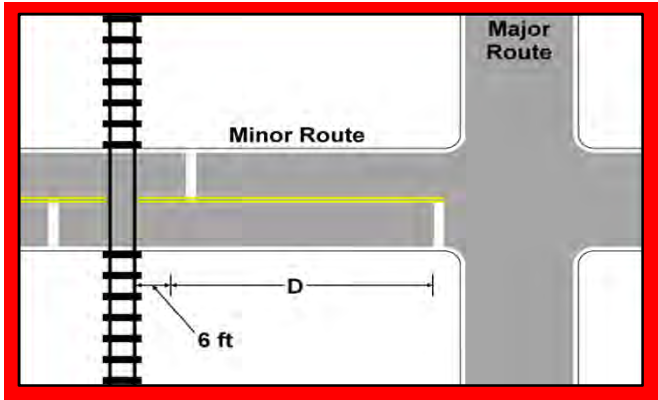
The need for a traffic control signal may be considered if an intersection that is controlled by a STOP or YIELD sign has a rail crossing within 140 feet of the stop/yield line and the highest Equivalent Minor Approach Traffic value lies above the curve represented on the graph below.

Minor Route Adjustment Factors - Enter the following:	
1. The number of occurrences of rail traffic/day:	
2. The percentage of "High-Occupancy Buses" crossing the track/day: <i>(A high-occupancy bus is defined as a bus occupied by at least 20 people)</i>	
3. The percentage of Tractor-trailer Trucks crossing the track/day:	

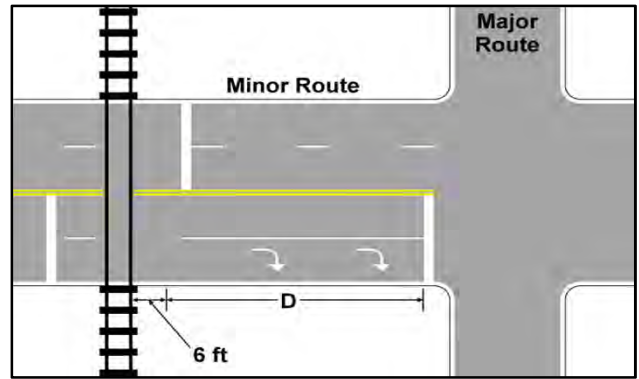
Satisfied: Yes No

Peak Hour Data		
Peak Hour	Major Route	Minor Route

Enter the distance value "D" from the STOP/YIELD bar to the track as shown below:

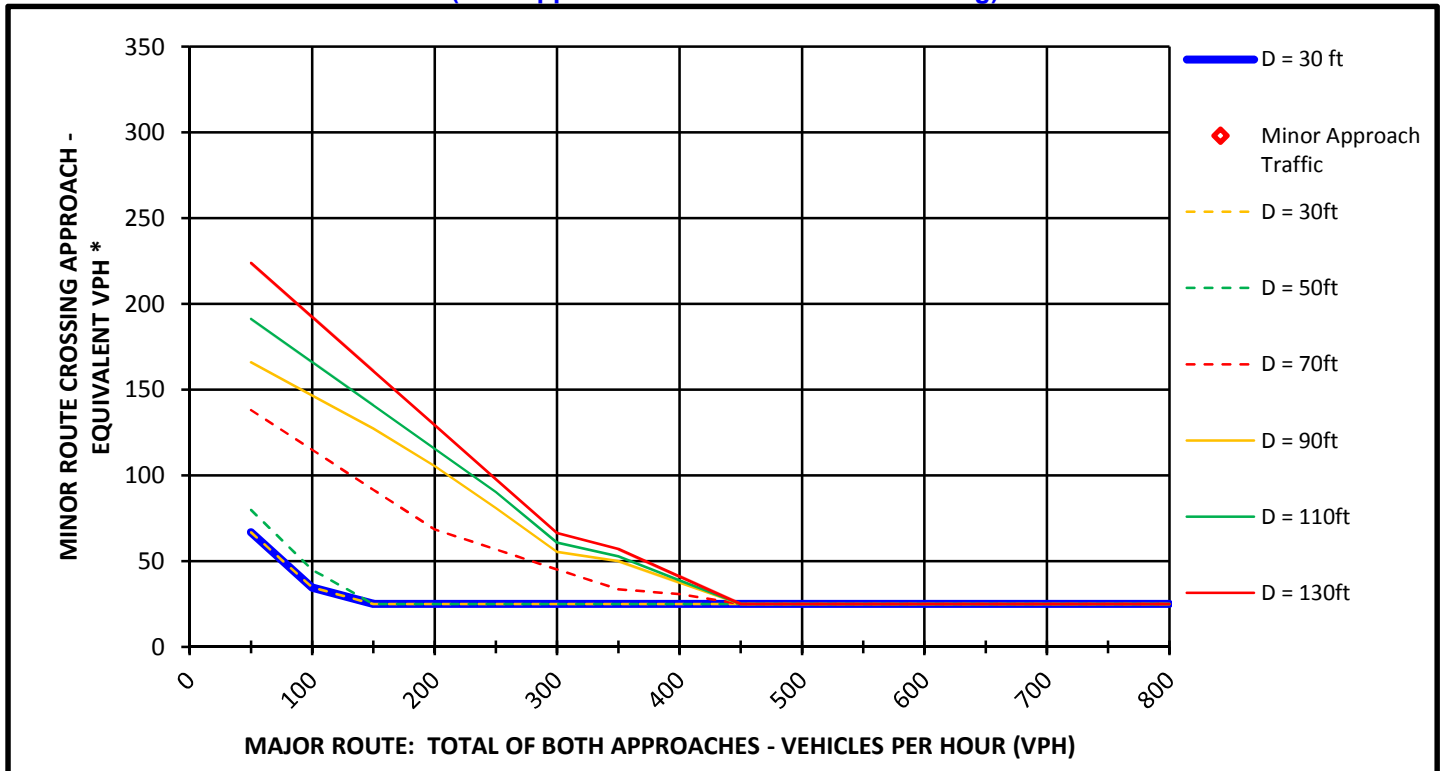


(One Approach Lane at the Track Crossing)



(Two or More Approach Lanes at the Track Crossing)

FIGURE W-9: Intersection Near a Grade Crossing
 (One Approach Lane at the Track Crossing)



* VPH after applying the adjustment factors for Rail, Bus, and Tractor-Trailer traffic
 25 vph applies as the lower threshold volume

TRAFFIC SIGNAL WARRANT SUMMARY

City/Town: Vestavia Hills
 County: Jefferson
 Division: RPCGB
 Data Date: 2/6/2019

Analysis Performed By: DC
 Date Analysis Performed: 2/26/2019
 Project Number if Applicable: 180337
 Weather Conditions: Showers

Major Route: Blue Lake Drive
 Minor Route: Sicard Hollow Road

Appr. Lanes: 1 Critical Approach Speed (mph): 35
 Appr. Lanes: 1

Warrant #1: Eight-Hour Vehicular Volume

SATISFIED
 Yes No

1A - Minimum Vehicular Volume: Yes No Yes No
 1B - Interruption of Continuous Traffic: Yes No Yes No

Any Remedial Measures Tried and their Outcome.

Warrant #2: Four-Hour Vehicular Volume

Yes No

Warrant #3: Peak Hour

Yes No

The Unusual Case(s) that Justifies the use of this Warrant.

Warrant #4: Pedestrian Volume

Yes No

Warrant #5: School Crossing

Yes No

Any Remedial Measures Implemented to improve the Safety of the Students.

Warrant #6: Coordinated Signal System

Yes No

Warrant #7: Crash Experience

Yes No

Other Alternatives that have failed to reduce crashes.

Warrant #8: Roadway Network

Yes No

Warrant #9: Intersection Near a Grade Crossing

Yes No

CONCLUSIONS

Warrants Satisfied:

2									
---	--	--	--	--	--	--	--	--	--

Remarks:

TRAFFIC SIGNAL WARRANTS

City/Town: **Vestavia Hills**
 County: **Jefferson County**
 Division: **RPCGB**
 Data Date: **2/6/2019**

Analysis Performed By: **DC**
 Date Analysis Performed: **3/8/2019**
 Project Number if Applicable: **180337**
 Weather Conditions: **Showers**

Major Route: **Columbiana Rd**
 Minor Route: **Shades Crest Rd**

Apr. Lanes: **2** Critical Approach Speed (mph): **45**
 Apr. Lanes: **1**

Volume Level Criteria

- 1. Is the critical speed of major street traffic > 70 km/h (40 mph) ? Yes No
- 2. Is the intersection in a built-up area or isolated community of <10,000 population? Yes No
- If Question 1 or 2 above is answered "Yes", then use "70%" volume level 70% 100%

WARRANT 1 - EIGHT-HOUR VEHICULAR VOLUME

Warrant 1 is satisfied if Condition A or Condition B is "100%" satisfied. Satisfied: Yes No

Warrant is also satisfied if both Condition A and Condition B are "80%" satisfied, given adequate trials of other remedial measures have been tried.

Adequate trial(s) of other remedial measures tried: Yes No

List Remedial Measures Tried (Required for 80% Combination of A & B)

Condition A - Minimum Vehicular Volume & Condition B - Interruption of Continuous Traffic

100% Satisfied: Yes No

(Used if neither Condition A or B is satisfied) 80% Satisfied: Yes No

		(volumes in veh/hr)		Minimum Requirements				Eight Highest Hours							
								5 PM	7 AM	4 PM	8 AM	3 PM	9 AM	6 PM	2 PM
		Approach Lanes		1	2 or more										
		Volume Level		100%	70%	100%	70%								
W - 1A	100%	Both Approaches on Major Street		500	350	600	420	1,806	1,863	1,557	1,508	1,157	1,183	1,074	995
		Highest Approach on Minor Street		150	105	200	140	405	128	422	123	289	125	223	200
W - 1B	100%	Both Approaches on Major Street		750	525	900	630	1,806	1,863	1,557	1,508	1,157	1,183	1,074	995
		Highest Approach on Minor Street		75	53	100	70	405	128	422	123	289	125	223	200
W - 1A	80%	Both Approaches on Major Street		400	280	480	336	1,806	1,863	1,557	1,508	1,157	1,183	1,074	995
		Highest Approach on Minor Street		120	84	160	112	405	128	422	123	289	125	223	200
W - 1B	80%	Both Approaches on Major Street		600	420	720	504	1,806	1,863	1,557	1,508	1,157	1,183	1,074	995
		Highest Approach on Minor Street		60	42	80	56	405	128	422	123	289	125	223	200

TRAFFIC SIGNAL WARRANTS

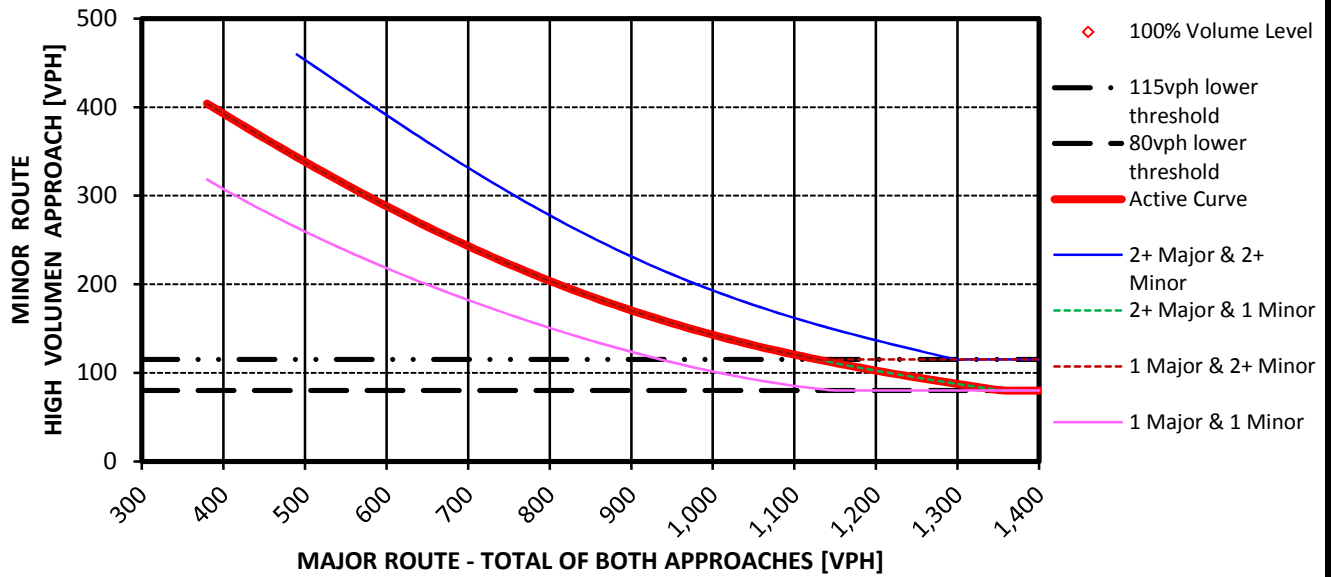
WARRANT 2 - FOUR-HOUR VEHICULAR VOLUME

Satisfied: Yes No

If all four points lie above the appropriate line, then this warrant is satisfied.

	Four Highest Hours			
	5 PM	7 AM	4 PM	8 AM
(Volumes in veh/hr)				
SUM of Both Approaches on Major Street	1,806	1,863	1,557	1,508
Highest Minor Street Approach	405	128	422	123

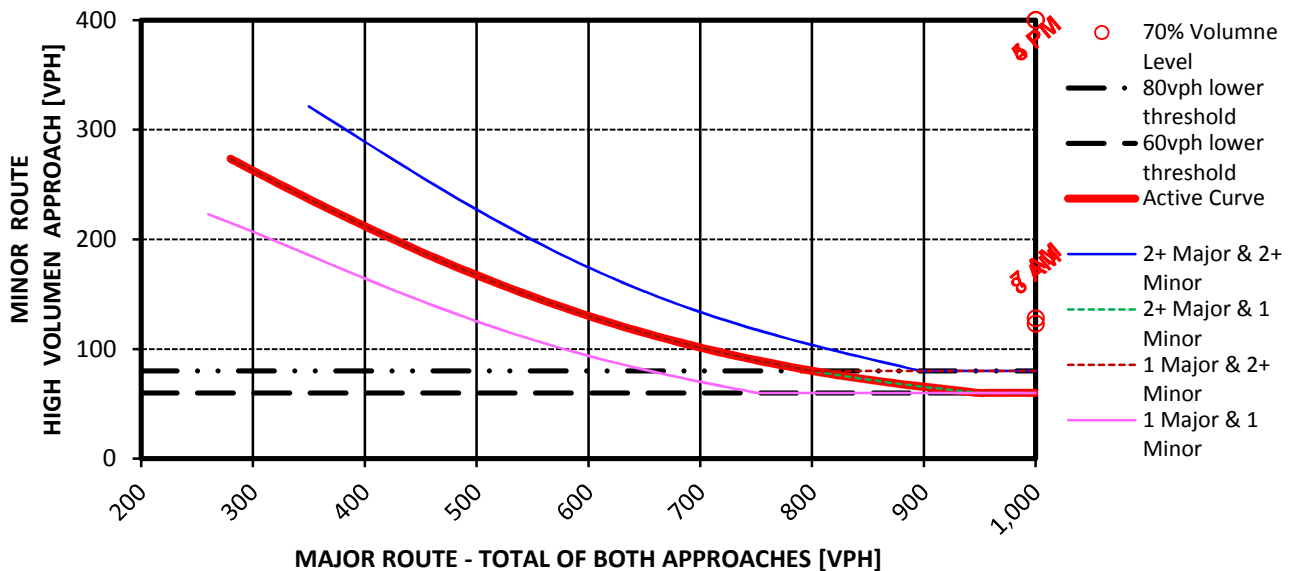
FIGURE W-2: Criteria for "100%" Volume Level



** Note: 115 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 80 vph applies as the lower threshold volume threshold for a minor route approach with one lane.*

FIGURE W-2: Criteria for "70%" Volume Level

(Community less-than 10,000 population or speeds greater-than 70 km/hr [40 mph] on Major Street)



** Note: 80 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 60 vph applies as the lower threshold volume threshold for a minor route approach with one lane.*

TRAFFIC SIGNAL WARRANTS

WARRANT 3 - PEAK HOUR VEHICULAR VOLUME

This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time period.

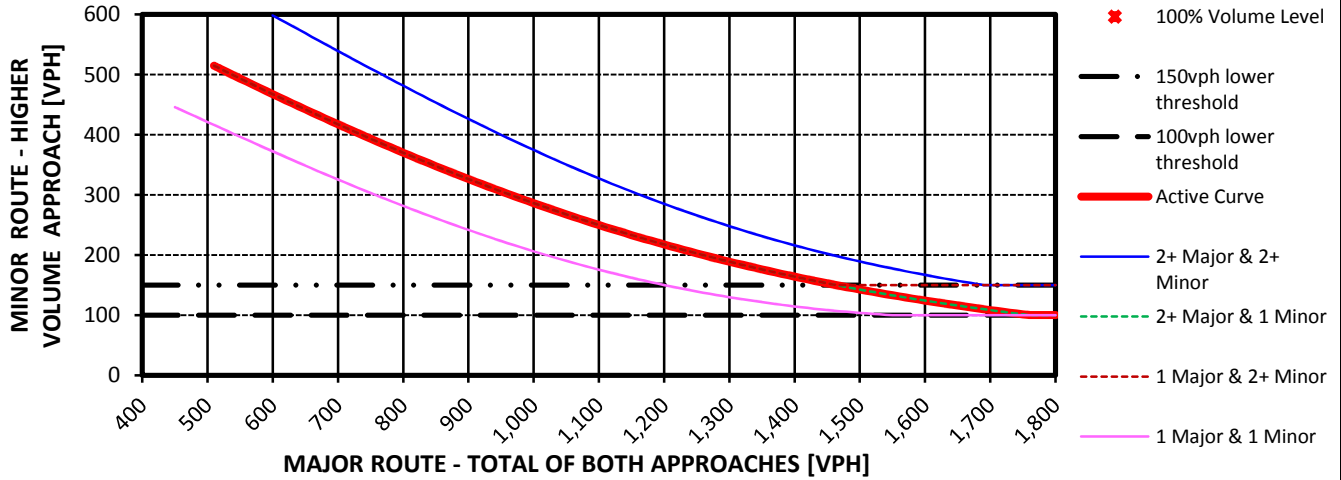
Applicable: Yes No
 Satisfied: Yes No

Signalization shall be considered if a point lies above the appropriate line or the Delay criteria is met.

Unusual case(s) justifying this Warrant:

Peak Hour Data		
Peak Hour	Major Route	Minor Route

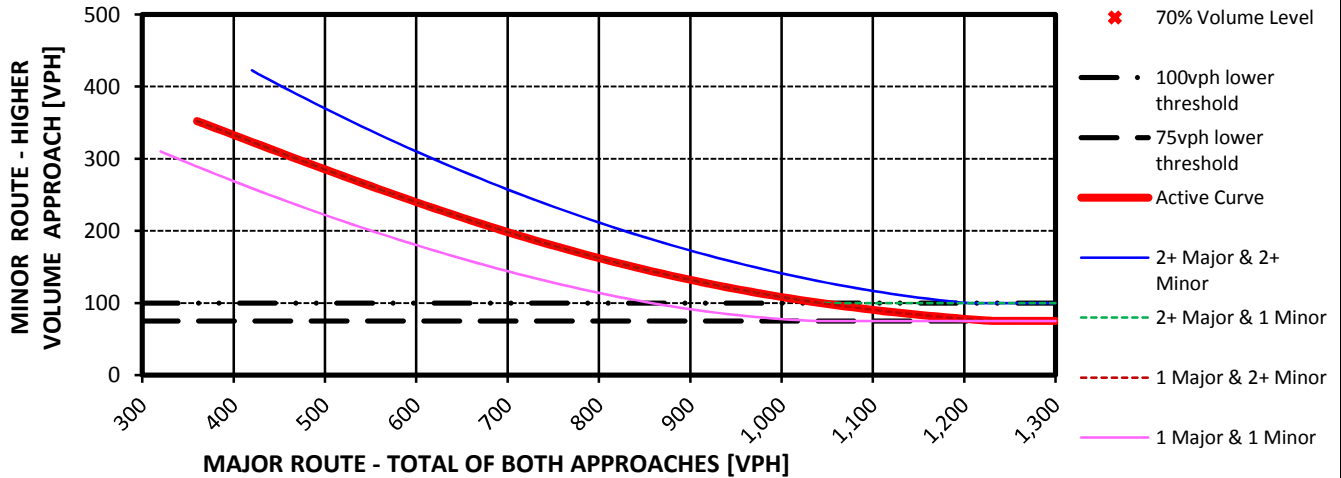
FIGURE W-3: Criteria for "100%" Volume Level



* Note: 150 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 100 vph applies as the lower threshold volume threshold for a minor route approach with one lane.

FIGURE W-3: Criteria for "70%" Volume Level

(Community less-than 10,000 population or speeds greater-than 70 km/hr [40 mph] on Major Street)



* Note: 100 vph applies as the lower threshold volume for a minor route approach with two or more lanes and 75 vph applies as the lower threshold volume threshold for a minor route approach with one lane.

DELAY CRITERIA	1. Delay on Minor Approach (vehicle-hours)				2. Volume on Minor Approach (veh/hr)				3. Total Entering Volume (veh/hr)					
	Approaches		Lanes		Approaches		Lanes		Number of Approaches		Volume Criteria			
	Approaches	1	2	Approaches	1	2	3	4 or more	No. of Approaches	3	4	Volume Criteria	650	800
	Delay Criteria:	4.0	5.0	Volume Criteria	100	150	Volume :		Volume :			Volume :		
Delay:			Volume :			Volume :		Volume :			Volume :			
Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO	Fullfilled?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> NO

TRAFFIC SIGNAL WARRANTS

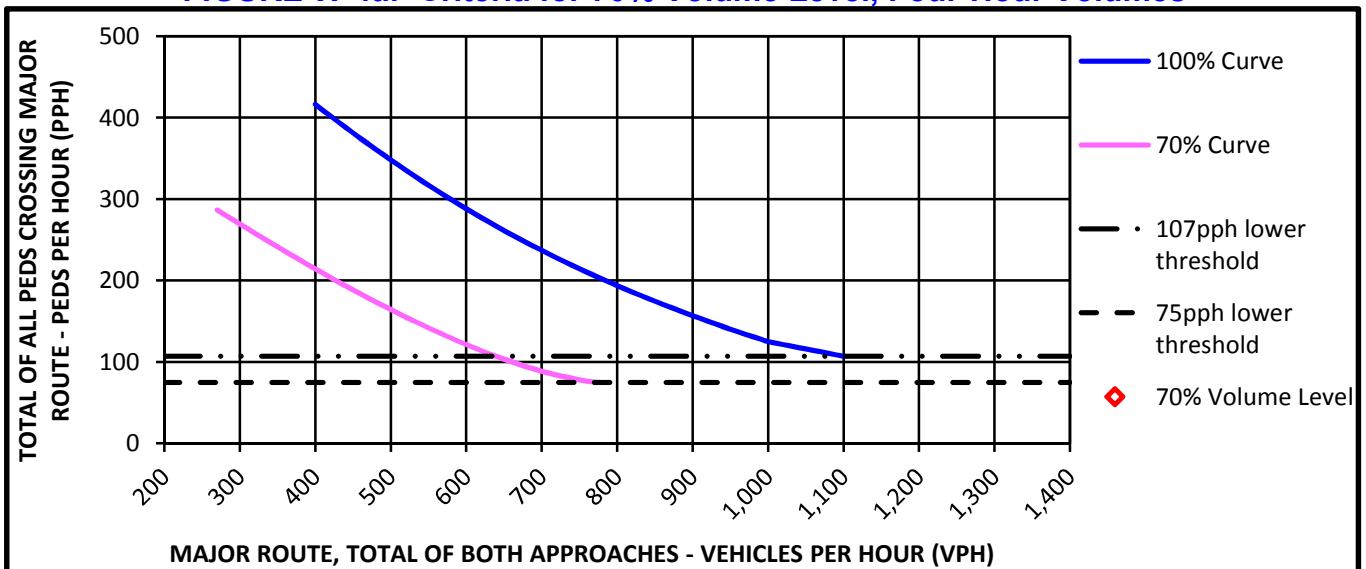
WARRANT 4 - PEDESTRIAN VOLUME

Satisfied: Yes No

Pedestrian Signal Location Criteria		Fulfilled?	
		Yes	No
The nearest traffic control device (signal or STOP sign) controlling traffic on the major route is more than 90m (300 ft) away:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		X
If no above, will this proposed signal restrict the progressive movement of traffic?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

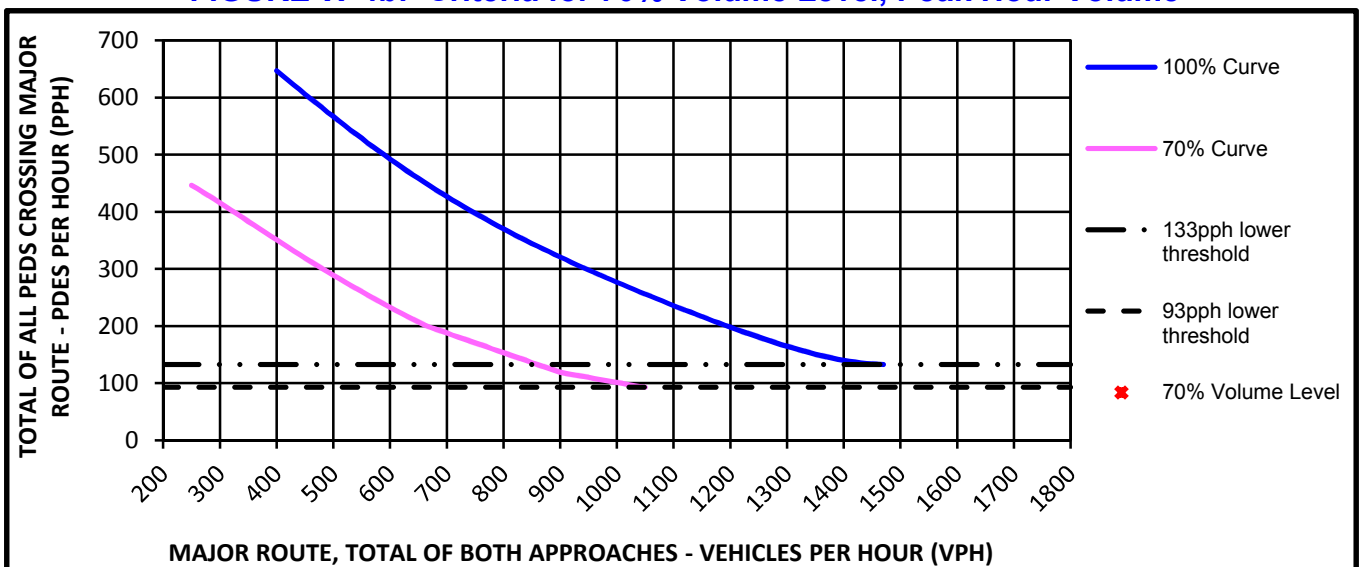
Vehicle volumes in veh/hr and Pedestrian volumes in ped/hr	Four Greatest Hours				Peak Hour
SUM of Both Approaches on Major Route					
Pedestrians crossing the Major Route					

FIGURE W-4a: Criteria for 70% Volume Level, Four-Hour Volumes



* Note: 107 pph applies as the lower threshold volume for the 100% Volume Level.
75 pph applies as the lower threshold volume for the 70% Volume Level.

FIGURE W-4b: Criteria for 70% Volume Level, Peak Hour Volume



* Note: 133 pph applies as the lower threshold volume for the 100% Volume Level.
93 pph applies as the lower threshold volume for the 70% Volume Level.

TRAFFIC SIGNAL WARRANTS

WARRANT 5 - SCHOOL CROSSING

Satisfied: Yes No

This warrant is intended for application where the fact that schoolchildren crossing the major route is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students. This warrant is satisfied if all three of the criteria below are fulfilled after remedial measures have been considered.

Any remedial measures implemented in or around the intersection to improve the safety of the students as noted in Section **4C.06 Warrant 5, School Crossing** in the MUTCD:

Criteria			Fulfilled?	
			Yes	No
1. Enter the number of schoolchildren crossing the major route along with the hour this occurs. The hour can be any 60 minute interval (ex 2:15 PM - 3:15 PM enter 2:15 - 3:15). Requires a minimum of 20 schoolchildren during the any hour.	Num. of Students	Highest Crossing Hour Period		X
2. For both the morning (AM) and afternoon (PM) periods of operation, enter the number of adequate gaps observed for each period and the number of minutes each period lasted. Requires one period to operate with fewer gaps than the number of minutes in the period.	AM PM	Period Minutes Gaps		X
3. Is the nearest traffic signal along the major route more than 90m (300 ft) from this crossing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If the signal is within 90m (300 ft) of an existing signalize intersection, will it restrict progressive movement of traffic? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				X

WARRANT 6 - COORDINATED SIGNAL SYSTEM

Satisfied: Yes No

Progressive movement in a coordinated signal system sometimes necessitates the installtion of traffic control signals at intersections that would not otherwise be considered in order to maintain proper platooning of vehicles. This warrant is satisfied if the below criteria is satisfied as follows: criteria 1 is satisfied and either criteria 2 or 3 is satisfied.

Criteria		Fulfilled?	
		Yes	No
1. The inclusion of this proposed signal, into the coordinated system, does not result in a signal spacing of less than 305m (1,000 ft)?			X
a. On a one-way street or a street that has traffic predominantly in one direction, are the adjacent traffic control signals so far apart that they do not provide the necessary degree of vehicluar platooning?			X
2. b. On a two-way street, do adjacent traffic control signals not provide the necessary degree of platooning and will the proposed and adjacent traffic control signals collectively provide a progressive operation?			X

TRAFFIC SIGNAL WARRANTS

WARRANT 7 - CRASH EXPERIENCE

Satisfied: Yes No

This warrant is intended for application where the severity and frequency of crashes are the principal reasons to consider the installation of a traffic control signal. The need for a traffic control signal shall be considered if an engineering study finds that criteria 1, 2, and 3 are met.

Criteria			Fulfilled?	
			Yes	No
1. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency as shown below:				
				X
2. How many crashes within the past 12 months? For this criteria to be met, five or more reported crashes, of types susceptible to correction by the installation of a traffic control signal, must have occurred.				X
3. If Warrant 1A or Warrant 1B are 80 percent satisfied of the current values or if Warrant 4, 4-hour or peak, is met at the 80 percent values.			Met?	
			Yes	No
Warrant 1, Condition A, Minimum Vehicular Volume (80 percent satisfied):			X	
Warrant 1, Condition B, Interruption of Continuous Traffic (80 percent satisfied):			X	
Warrant 4, Four-Hour Volume (80 percent satisfied):				X
Warrant 4, Peak Hour Volume (80 percent satisfied):				X
			X	

WARRANT 8 - ROADWAY NETWORK

Satisfied: Yes No

This warrant is used to encourage the concentration and organization of traffic flow on a roadway network. This warrant is satisfied if one of the following 2 criteria is met and both routes meet at least one of the characteristics of a Major Route below.

Criteria				Met?		Fulfilled?	
				Yes	No	Yes	No
1. Both of the criteria to the right are required in order to be met.	a. Please enter the total existing, or immediately projected, entering traffic volume during the peak hour of a typical weekday. Requires a minimum of 1,000 vehicles to be met.	Volume			X		X
	b. Based on an engineering study, does the 5 year projected traffic volumes, for this location, meet one or more of Warrants 1, 2, or 3 during an average weekday? *				X		
2. Enter the total existing, or immediately projected, entering volume for each of any 5 hours of a non-normal business day. (Saturday or Sunday). 1,000 vph for each hour required.						← Hour	X
						← Volume	

* Supporting data required for verification of the projected 5 year traffic Warrants.

A major route, as used in this signal warrant, shall have at least one of the following characteristics:			Met?		Fulfilled?	
Characteristics of Major Routes			Yes	No	Yes	No
1. Is it a part of the street or highway system that serves as the principal roadway network for through traffic flow?	Major Route			X	X	
	* Minor Route			X		
2. Does it include rural or suburban highways outside, entering, or traversing a city?	Major Route			X		
	* Minor Route			X		
3. Does it appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study?	Major Route			X		
	* Minor Route			X		

* This is a minor route, but for the purposes of this Warrant, shall be considered as the other major route.

Note: Supporting data shall be required to verify the routes meet one of the characteristics of a major route.

TRAFFIC SIGNAL WARRANTS

WARRANT 9 - INTERSECTION NEAR A GRADE CROSSING

Applicable
 Yes No

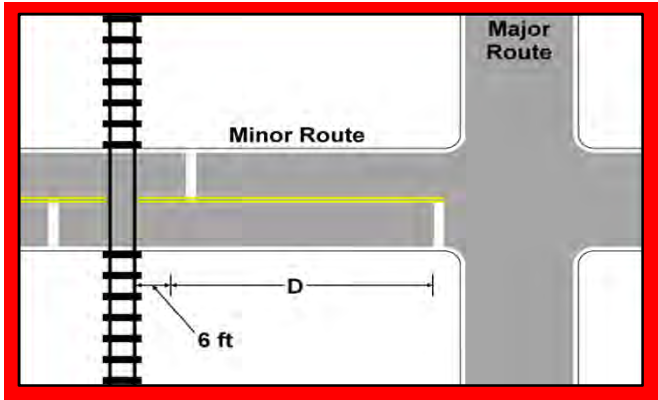
The need for a traffic control signal may be considered if an intersection that is controlled by a STOP or YIELD sign has a rail crossing within 140 feet of the stop/yield line and the highest Equivalent Minor Approach Traffic value lies above the curve represented on the graph below.

Minor Route Adjustment Factors - Enter the following:	
1. The number of occurrences of rail traffic/day:	
2. The percentage of "High-Occupancy Buses" crossing the track/day: (A high-occupancy bus is defined as a bus occupied by at least 20 people)	
3. The percentage of Tractor-trailer Trucks crossing the track/day:	

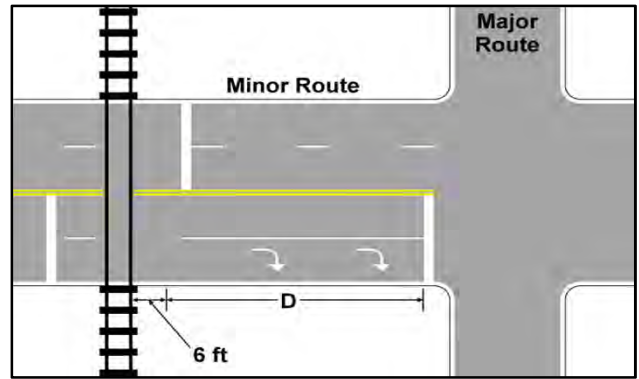
Satisfied: Yes No

Peak Hour Data		
Peak Hour	Major Route	Minor Route

Enter the distance value "D" from the STOP/YIELD bar to the track as shown below:

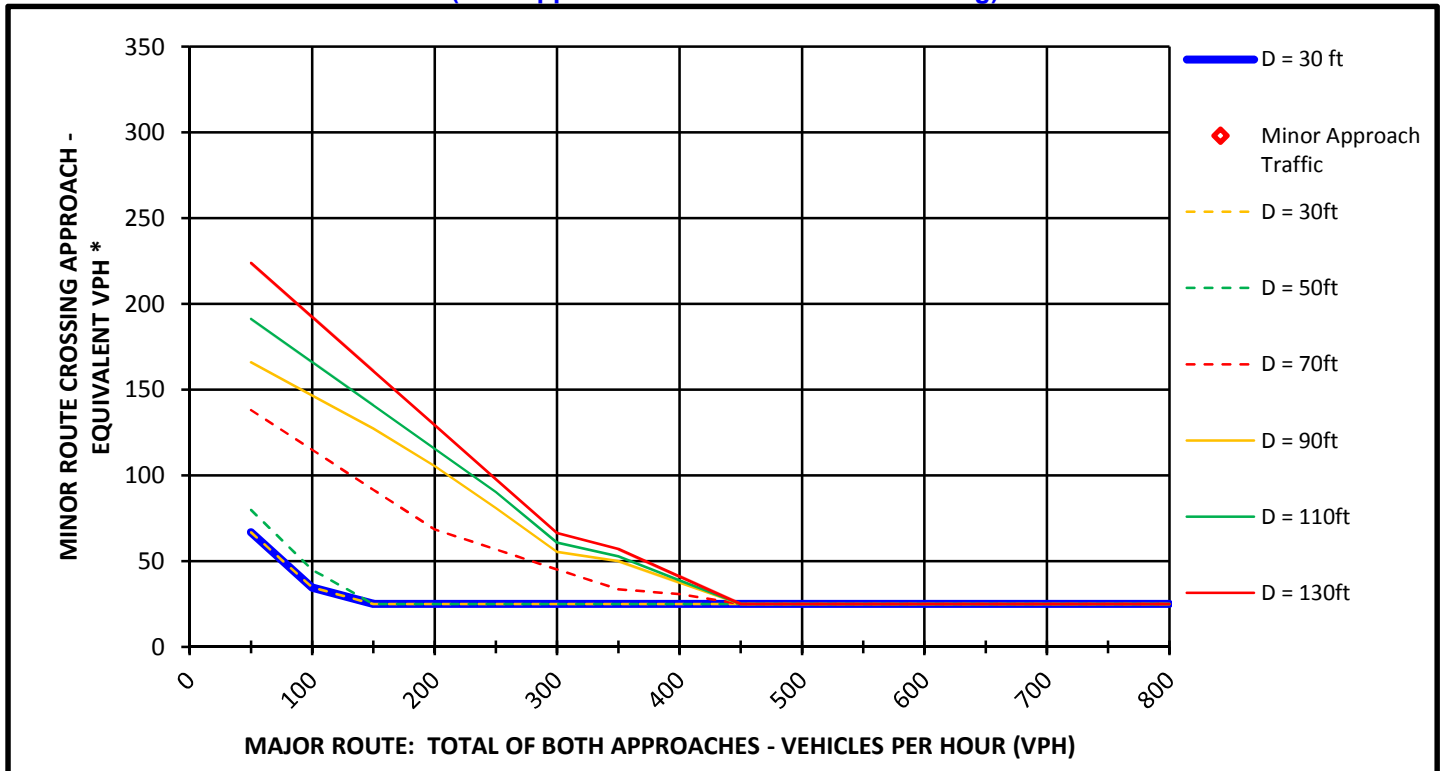


(One Approach Lane at the Track Crossing)



(Two or More Approach Lanes at the Track Crossing)

FIGURE W-9: Intersection Near a Grade Crossing
(One Approach Lane at the Track Crossing)



* VPH after applying the adjustment factors for Rail, Bus, and Tractor-Trailer traffic
 25 vph applies as the lower threshold volume

TRAFFIC SIGNAL WARRANT SUMMARY

City/Town: Vestavia Hills
 County: Jefferson County
 Division: RPCGB
 Data Date: 2/6/2019

Analysis Performed By: DC
 Date Analysis Performed: 3/8/2019
 Project Number if Applicable: 180337
 Weather Conditions: Showers

Major Route: Columbiana Rd
 Minor Route: Shades Crest Rd

Appr. Lanes: 2 Critical Approach Speed (mph): 45
 Appr. Lanes: 1

Warrant #1: Eight-Hour Vehicular Volume

SATISFIED
 Yes No

1A - Minimum Vehicular Volume: **80% Satisfied** **100% Satisfied**
 Yes No Yes No
 1B - Interruption of Continuous Traffic: Yes No Yes No

Any Remedial Measures Tried and their Outcome.

Warrant #2: Four-Hour Vehicular Volume

Yes No

Warrant #3: Peak Hour

Yes No

The Unusual Case(s) that Justifies the use of this Warrant.

Warrant #4: Pedestrian Volume

Yes No

Warrant #5: School Crossing

Yes No

Any Remedial Measures Implemented to improve the Safety of the Students.

Warrant #6: Coordinated Signal System

Yes No

Warrant #7: Crash Experience

Yes No

Other Alternatives that have failed to reduce crashes.

Warrant #8: Roadway Network

Yes No

Warrant #9: Intersection Near a Grade Crossing

Yes No

CONCLUSIONS

Warrants Satisfied:

1	2								
---	---	--	--	--	--	--	--	--	--

Remarks:

Appendix G – CARS Reports

Safe Curve Speed Analysis Report

Curve: Blue Lake Drive at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Left: 25 mph
 Selected RAS - Right: 20 mph

Analysis summary

Pass #	Turn Direction	Travel Direction	Point of Curvature Latitude Longitude	Point of Tangent Latitude Longitude	GPS Fit	Average Test Speed	Curve Radius	Curve Length	Deflection Angle	Curve Class.	Elevation at Apex	Curve Grade	Min. Calculated Advisory Speed	Recommended Advisory Speed (RAS)
1	Right	South-West	33.45109° -86.71785°	33.45027° -86.71828°	98.3%	35.1 mph	292 ft	346 ft	58°	F	-1.9%	A	21.3 mph	20 mph
2	Left	East	33.45031° -86.71824°	33.45115° -86.71781°	98.3%	35.9 mph	297 ft	352 ft	58°	F	-2.0%	B	25.0 mph	25 mph
3*	Left	North-East	33.45031° -86.71823°	33.45116° -86.71781°	98.8%	35.0 mph	288 ft	354 ft	60°	F	-2.6%	A	24.3 mph	25 mph
4*	Right	South	33.45113° -86.71786°	33.45035° -86.71822°	98.3%	36.1 mph	294 ft	322 ft	55°	F	-5.3%	A	23.2 mph	20 mph

Sign recommendation summary

Pass #	Differential	Curve Sign	Curve Sign Requirements	Advisory Speed Sign	Speed Sign Requirements	Chevron Sign	Chevron Spacing	Chevron Requirements	Note
1	-15 mph	W1-1	required	20 mph	required	W1-8	80 ft	required	
2	-10 mph	W1-1	required	25 mph	required	W1-8	80 ft	recommended	
3*	-10 mph	W1-1	required	25 mph	required	W1-8	80 ft	recommended	
4*	-15 mph	W1-1	required	20 mph	required	W1-8	80 ft	required	

*Selected passes shaded and in bold

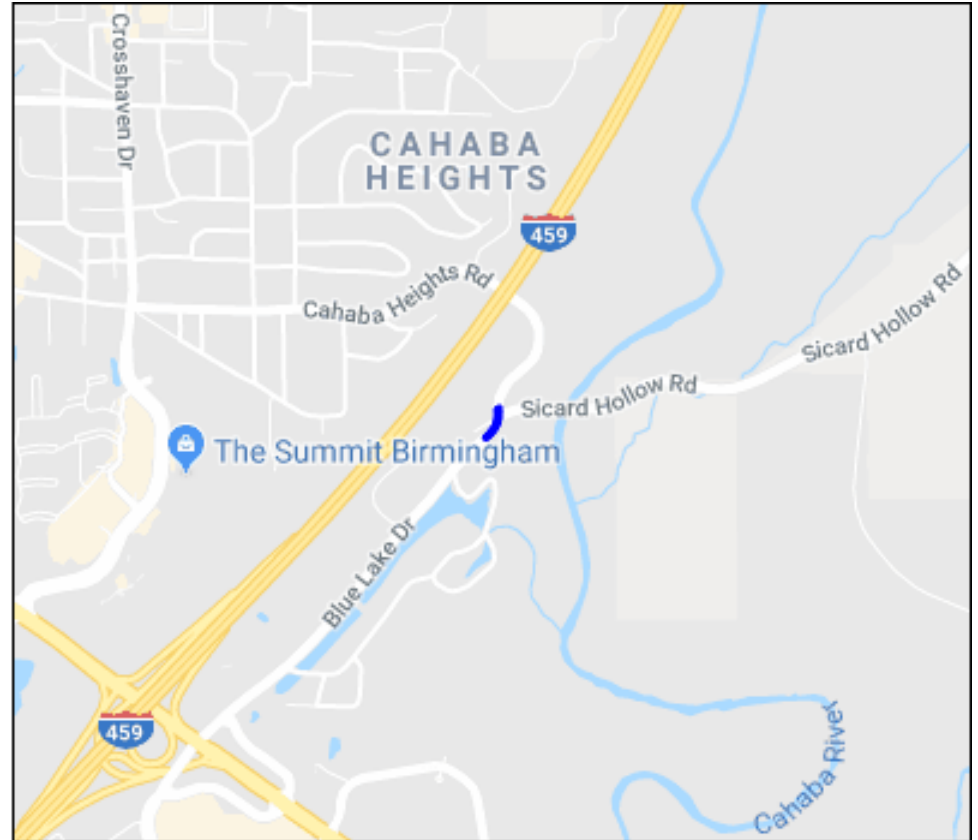
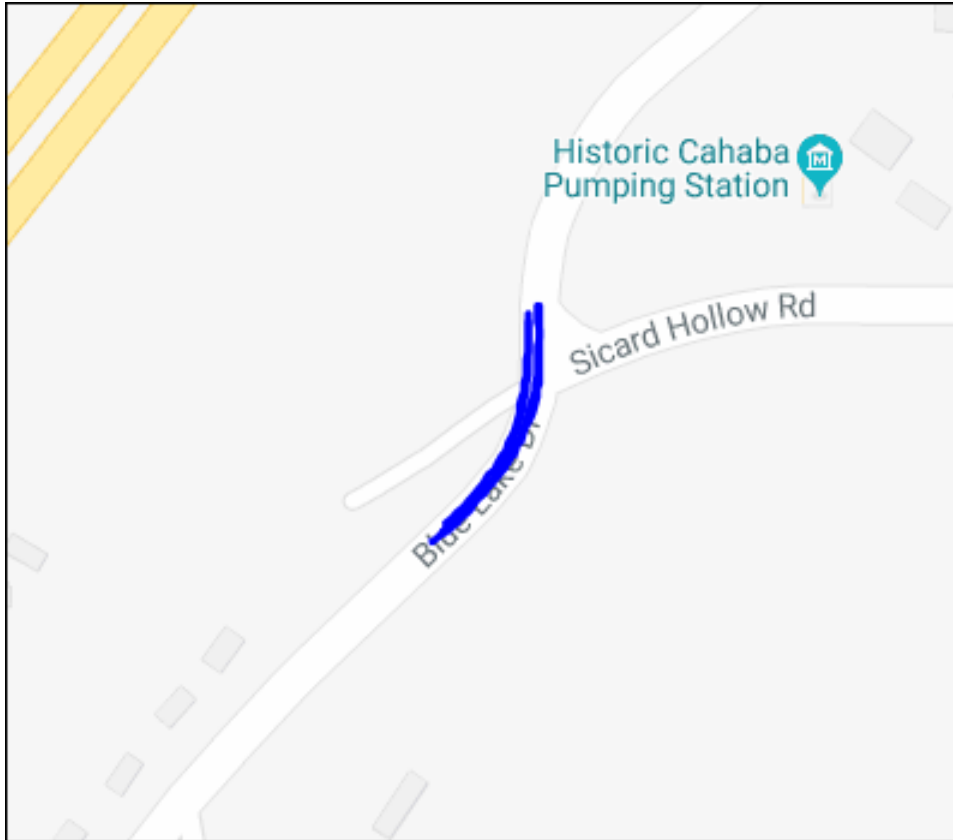
Safe Curve Speed Analysis Report

Curve: Blue Lake Drive at Sicard Hollow Road
Corridor: N/A
Mile Post: N/A

Lateral Friction Limit: 12°
Model Geometry: Parabolic

Posted Speed: 35 mph
Selected RAS - Left: 25 mph
Selected RAS - Right: 20 mph

Curve map reference - Blue Lake Drive at Sicard Hollow Road





Safe Curve Speed Analysis Report

Curve: Blue Lake Drive at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Left: 25 mph
 Selected RAS - Right: 20 mph

Side friction summary - Blue Lake Drive at Sicard Hollow Road, pass 3

Radius: 301 ft; Super elevation: -7.8%

Advisory Speed (mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Auto Side friction guideline (deg)	16	16	16	16	14	14	12	12	12	12	12	12	12	12
Max side friction (deg)	4.8	5.7	7.3	9.4	12.2	15.5	19.3	23.4	27.8	32.3	36.8	41.2	45.4	49.4

Theoretical side friction at point generating the maximum side friction value



Safe Curve Speed Analysis Report

Curve: Blue Lake Drive at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Left: 25 mph
 Selected RAS - Right: 20 mph

Side friction summary - Blue Lake Drive at Sicard Hollow Road, pass 4

Radius: 300 ft; Super elevation: -9.0%

Advisory Speed (mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Auto Side friction guideline (deg)	16	16	16	16	14	14	12	12	12	12	12	12	12	12
Max side friction (deg)	5.4	6.4	7.9	10.1	12.9	16.2	19.9	24.0	28.4	32.9	37.3	41.7	45.8	49.7

Theoretical side friction at point generating the maximum side friction value



Safe Curve Speed Analysis Report

Curve: Blue Lake Drive at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Left: 25 mph
 Selected RAS - Right: 20 mph

Data session summary - Blue Lake Drive at Sicard Hollow Road

Pass #	Data Session File Name	Collected On Collected By	Prior Calibration Subsequent Calibration
1	c Cochran@sain.com 2017/07/11 15:37:30 SN808770	07/11/17 15:37 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
2	c Cochran@sain.com 2017/07/11 15:40:49 SN808770	07/11/17 15:40 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
3	c Cochran@sain.com 2017/07/11 15:44:53 SN808770	07/11/17 15:44 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
4	c Cochran@sain.com 2017/07/11 15:48:22 SN808770	07/11/17 15:48 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55

Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 35 mph

Analysis summary

Pass #	Turn Direction	Travel Direction	Point of Curvature Latitude Longitude	Point of Tangent Latitude Longitude	GPS Fit	Average Test Speed	Curve Radius	Curve Length	Deflection Angle	Curve Class.	Elevation at Apex	Curve Grade	Min. Calculated Advisory Speed	Recommended Advisory Speed (RAS)
1	Left	South-West	33.45192° -86.71749°	33.45132° -86.71783°	98.1%	36.5 mph	364 ft	253 ft	36°	F	8.3%	A	38.8 mph	35 mph
2*	Right	East	33.45148° -86.71777°	33.45208° -86.71731°	99.2%	35.8 mph	368 ft	265 ft	38°	F	8.5%	A	38.3 mph	35 mph
3	Right	East	33.45122° -86.71781°	33.45216° -86.71717°	98.4%	35.2 mph	381 ft	426 ft	55°	F	7.3%	A	38.9 mph	35 mph
4*	Left	South-West	33.45216° -86.71718°	33.45136° -86.71784°	99.0%	35.7 mph	414 ft	373 ft	46°	F	6.0%	B	38.7 mph	35 mph

Sign recommendation summary

Pass #	Differential	Curve Sign	Curve Sign Requirements	Advisory Speed Sign	Speed Sign Requirements	Chevron Sign	Chevron Spacing	Chevron Requirements	Note
1	N/A	W1-2	none	35 mph	none	W1-8	80 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit
2*	N/A	W1-2	none	35 mph	none	W1-8	80 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit
3	N/A	W1-2	none	35 mph	none	W1-8	80 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit
4*	N/A	W1-2	none	35 mph	none	W1-8	120 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit

*Selected passes shaded and in bold

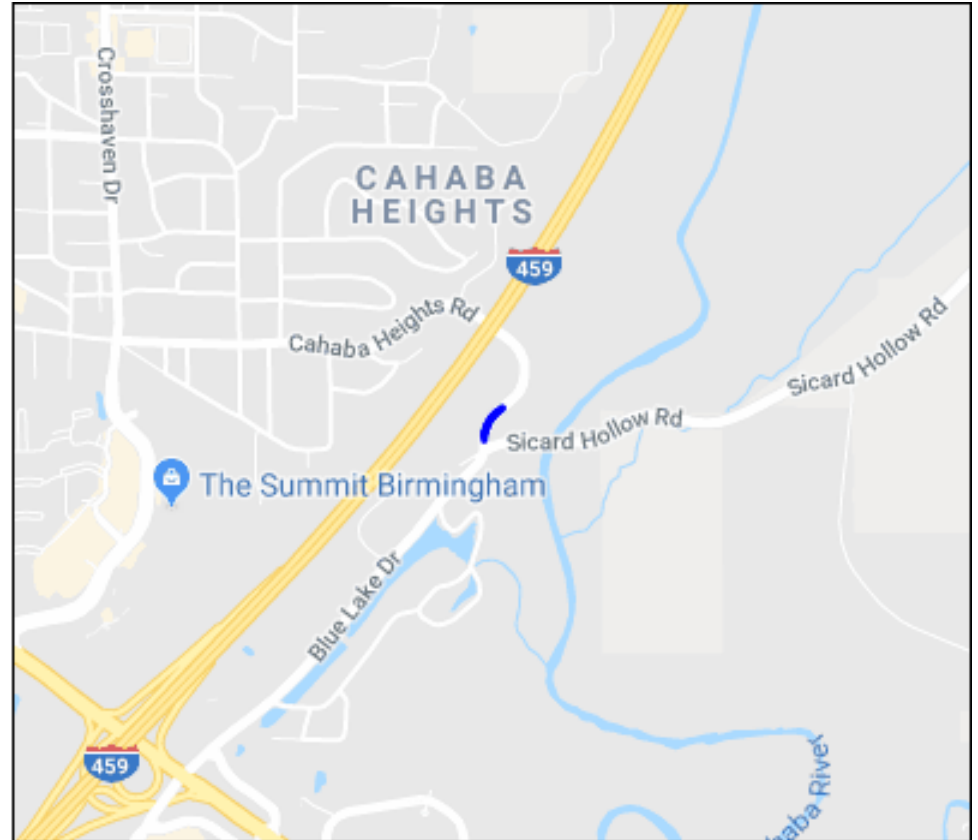
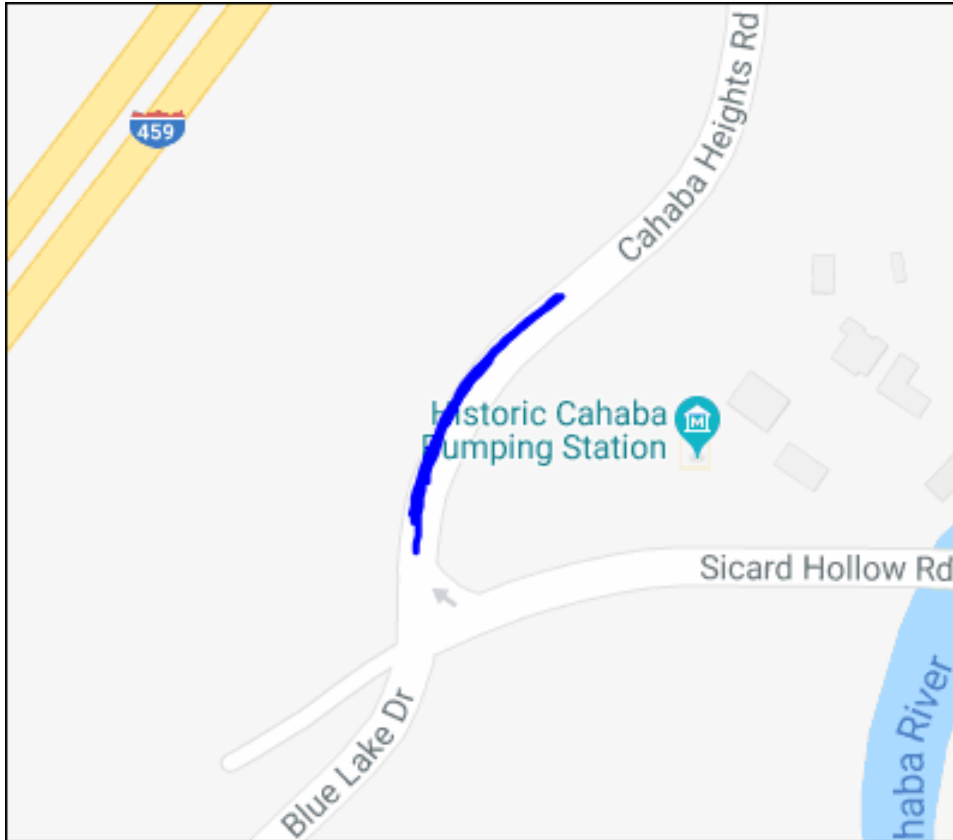
Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 35 mph

Curve map reference - Cahaba Heights Road at Sicard Hollow Road





Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 35 mph

Side friction summary - Cahaba Heights Road at Sicard Hollow Road, pass 2

Radius: 402 ft; Super elevation: 3.5%

Advisory Speed (mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Auto Side friction guideline (deg)	16	16	16	16	14	14	12	12	12	12	12	12	12	12
Max side friction (deg)	-1.8	-1.1	0.1	1.8	3.9	6.5	9.5	13.0	16.8	20.8	25.1	29.4	33.7	37.9

Theoretical side friction at point generating the maximum side friction value



Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 35 mph

Side friction summary - Cahaba Heights Road at Sicard Hollow Road, pass 4

Radius: 417 ft; Super elevation: 3.1%

Advisory Speed (mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Auto Side friction guideline (deg)	16	16	16	16	14	14	12	12	12	12	12	12	12	12
Max side friction (deg)	-1.6	-0.9	0.3	1.9	3.9	6.4	9.4	12.7	16.3	20.3	24.4	28.6	32.9	37.0

Theoretical side friction at point generating the maximum side friction value



Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road at Sicard Hollow Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 35 mph

Data session summary - Cahaba Heights Road at Sicard Hollow Road

Pass #	Data Session File Name	Collected On Collected By	Prior Calibration Subsequent Calibration
1	c Cochran@sain.com 2017/07/11 15:37:30 SN808770	07/11/17 15:37 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
2	c Cochran@sain.com 2017/07/11 15:40:49 SN808770	07/11/17 15:40 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
3	c Cochran@sain.com 2017/07/11 15:44:53 SN808770	07/11/17 15:44 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
4	c Cochran@sain.com 2017/07/11 15:48:22 SN808770	07/11/17 15:48 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55

Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 40 mph

Analysis summary

Pass #	Turn Direction	Travel Direction	Point of Curvature Latitude Longitude	Point of Tangent Latitude Longitude	GPS Fit	Average Test Speed	Curve Radius	Curve Length	Deflection Angle	Curve Class.	Elevation at Apex	Curve Grade	Min. Calculated Advisory Speed	Recommended Advisory Speed (RAS)
1	Right	South	33.45342° -86.71635°	33.45252° -86.71665°	99.1%	40.2 mph	425 ft	351 ft	43°	F	4.5%	C	38.9 mph	35 mph
2	Left	North-East	33.45245° -86.71674°	33.45411° -86.71672°	95.9%	34.5 mph	397 ft	700 ft	77°	F	10.5%	C	37.3 mph	35 mph
3*	Right	South	33.45408° -86.71673°	33.45246° -86.71673°	97.3%	35.4 mph	382 ft	668 ft	77°	F	9.8%	C	34.7 mph	35 mph
4*	Left	North-East	33.45283° -86.71642°	33.45413° -86.71674°	97.6%	34.5 mph	383 ft	530 ft	65°	F	9.7%	C	40.5 mph	40 mph
5	Right	South	33.45407° -86.71673°	33.45245° -86.71674°	97.0%	35.1 mph	382 ft	681 ft	77°	F	9.4%	C	36.7 mph	35 mph

Sign recommendation summary

Pass #	Differential	Curve Sign	Curve Sign Requirements	Advisory Speed Sign	Speed Sign Requirements	Chevron Sign	Chevron Spacing	Chevron Requirements	Note
1	N/A	W1-2	none	35 mph	none	W1-8	120 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit
2	N/A	W1-2	none	35 mph	none	W1-8	80 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit
3*	N/A	W1-2	none	35 mph	none	W1-8	80 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit
4*	N/A	W1-2	none	40 mph	none	W1-8	80 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit
5	N/A	W1-2	none	35 mph	none	W1-8	80 ft	none	The Recommended Advisory Speed for this pass is at or above the posted speed limit

*Selected passes shaded and in bold

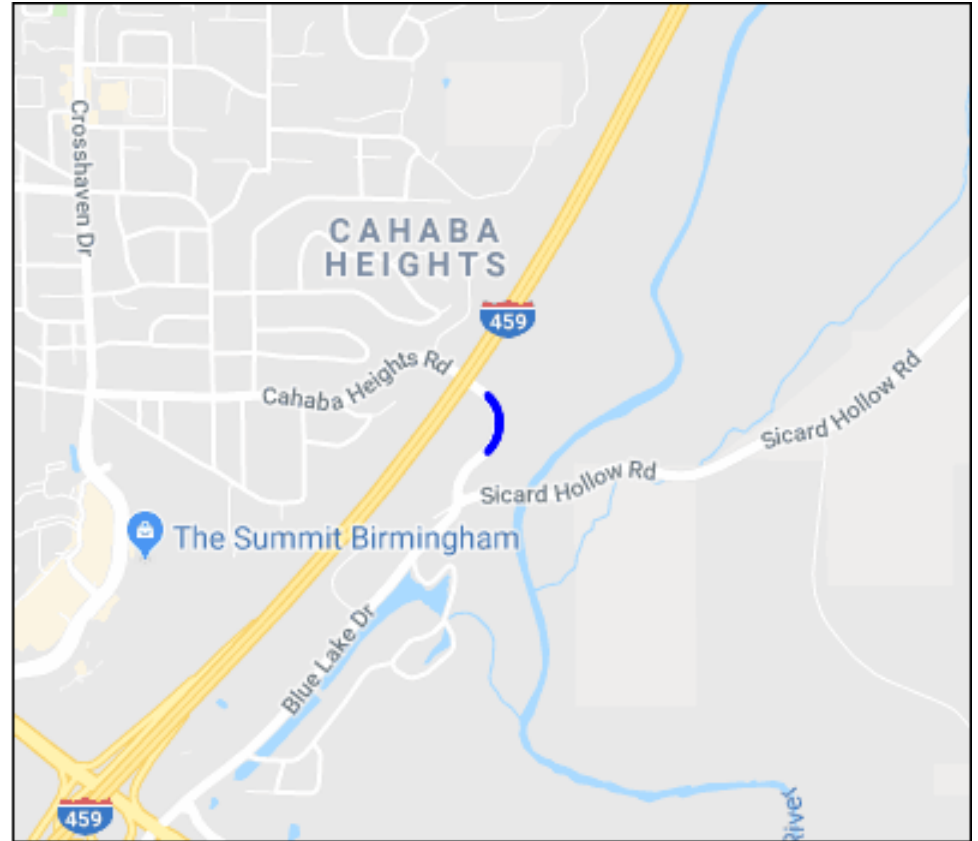
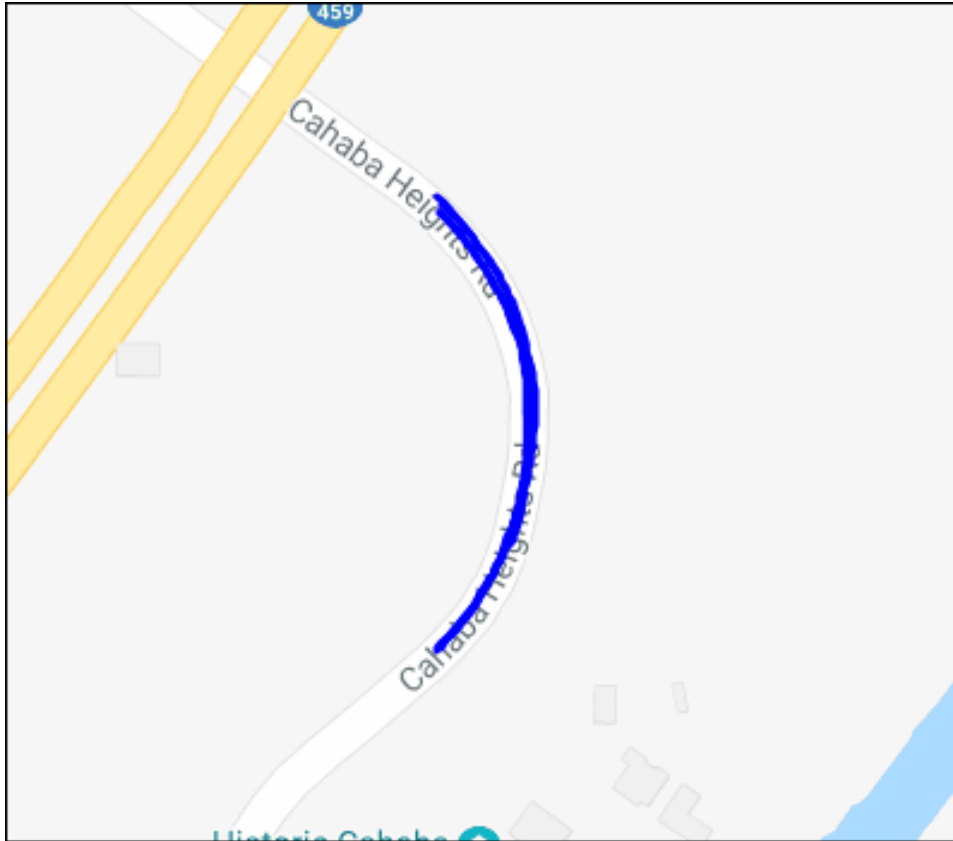
Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road
Corridor: N/A
Mile Post: N/A

Lateral Friction Limit: 12°
Model Geometry: Parabolic

Posted Speed: 35 mph
Selected RAS - Right: 35 mph
Selected RAS - Left: 40 mph

Curve map reference - Cahaba Heights Road





Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 40 mph

Side friction summary - Cahaba Heights Road, pass 3

Radius: 446 ft; Super elevation: -2.9%

Advisory Speed (mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Auto Side friction guideline (deg)	16	16	16	16	14	14	12	12	12	12	12	12	12	12
Max side friction (deg)	1.8	2.5	3.6	5.0	7.0	9.3	12.0	15.0	18.3	21.9	25.7	29.6	33.4	37.3

Theoretical side friction at point generating the maximum side friction value



Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 40 mph

Side friction summary - Cahaba Heights Road, pass 4

Radius: 402 ft; Super elevation: 6.3%

Advisory Speed (mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Auto Side friction guideline (deg)	16	16	16	16	14	14	12	12	12	12	12	12	12	12
Max side friction (deg)	-3.4	-2.7	-1.5	0.2	2.3	4.9	8.0	11.4	15.3	19.4	23.7	28.1	32.5	36.9

Theoretical side friction at point generating the maximum side friction value



Safe Curve Speed Analysis Report

Curve: Cahaba Heights Road
 Corridor: N/A
 Mile Post: N/A

Lateral Friction Limit: 12°
 Model Geometry: Parabolic

Posted Speed: 35 mph
 Selected RAS - Right: 35 mph
 Selected RAS - Left: 40 mph

Data session summary - Cahaba Heights Road

Pass #	Data Session File Name	Collected On Collected By	Prior Calibration Subsequent Calibration
1	c Cochran@sain.com 2017/07/11 15:37:30 SN808770	07/11/17 15:37 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
2	c Cochran@sain.com 2017/07/11 15:40:49 SN808770	07/11/17 15:40 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
3	c Cochran@sain.com 2017/07/11 15:42:30 SN808770	07/11/17 15:42 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
4	c Cochran@sain.com 2017/07/11 15:44:53 SN808770	07/11/17 15:44 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55
5	c Cochran@sain.com 2017/07/11 15:48:22 SN808770	07/11/17 15:48 c Cochran@sain.com	Passed on 07/11/17 15:07 Passed on 07/11/17 16:55

Appendix H – Previous Study Recommendations at US-31 and Columbiana Road/I-65 Northbound Ramps



*Proposed signal head for the southern most signal facing eastbound traffic

Restripe left turn skip striping (min. 75' radius)

Install through arrow pavement markings

Replace signal with three section signal head with green through arrow. *See insert above.

Install No Right Turn (R3-1) sign angled toward eastbound through lanes.

Replace existing DO NOT ENTER signs with oversized signs and install red retroreflective strips on sign posts

Install lane separating base with reboundable delineators along double yellow line from stop line to north end of existing concrete barrier

Install Type 2-C RPMs along east side of exit ramp edge lines and Type 2-E RPMs along west side, extending 150'-200' from stop line

Replace Keep Right (R4-7) sign with oversized sign

Install oversized WRONG WAY sign 125' from DO NOT ENTER sign near ramp terminus and install red retroreflective strip on sign post

Restripe right turn arrow pavement marking and install two other lane use pavement markings. Surround all with Type 2-C RPMs.

Remove existing WRONG WAY sign mounted on back of INFORMATION sign

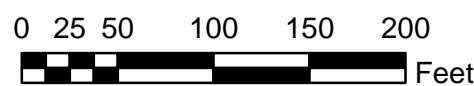
Install lane use pavement markings and surround with Type 2-C RPMs

Install oversized WRONG WAY sign and install red retroreflective strip on sign post

LEGEND

- Oversized DO NOT ENTER sign, R5-1, 36" x 36"
- Oversized WRONG WAY sign, R5-1a, 42" x 30"
- Overhead Lighting
- Utility Pole





Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, User Community

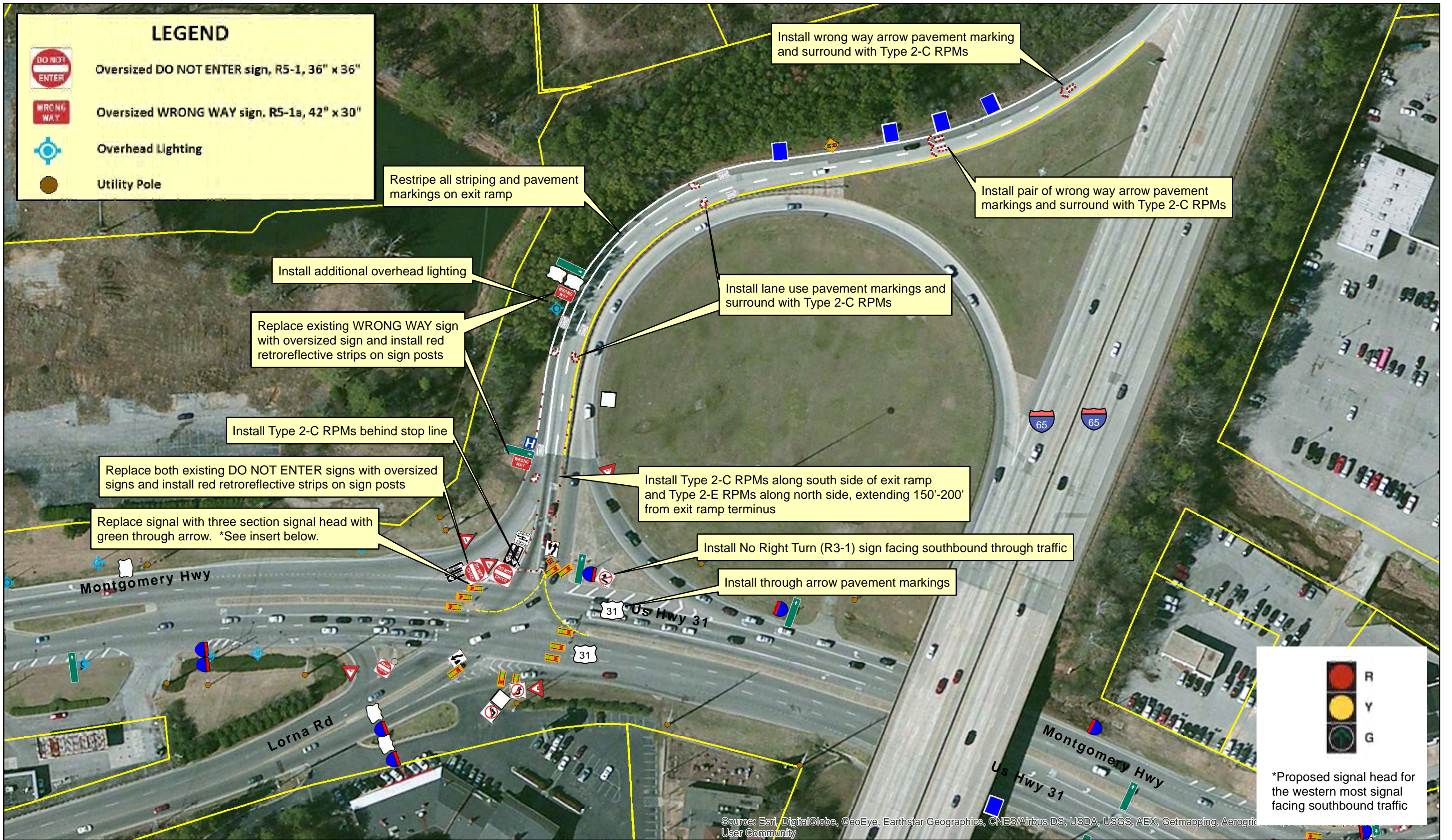


Concept Map: I-65, Exit 252, East Side, US-31/Montgomery Hwy

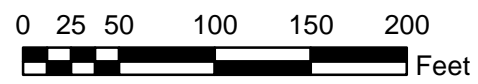
Potential Wrong Way Movement Assessment at Interstate Ramps
Alabama Department of Transportation

LEGEND

-  Oversized DO NOT ENTER sign, R5-1, 36" x 36"
-  Oversized WRONG WAY sign, R5-1a, 42" x 30"
-  Overhead Lighting
-  Utility Pole



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, User Community



Appendix I – Opinion of Probable Costs

Improvement Recommendations Opinion of Probable Cost

Rocky Ridge Road @ Dolly Ridge Road (Short Term)				
Item Description	Unit	Quantity	Unit Price	Amount
Concrete Slope Paving ¹	CY	60	\$250	\$15,000
Installation of Left Turn Phase ²	LS	1	\$11,000	\$11,000
Span Wire Reconfiguration ³	LS	1	\$13,000	\$13,000
Pedestrian Facilities ⁴	By Others		By Others	
Traffic Control	LS	1	\$10,000	\$10,000
Subtotal				\$49,000
Contingency ⁵			25%	\$13,000
Construction Costs				\$62,000
Engineering Controls			1.3%	\$1,000
Mobilization			9.7%	\$7,000
Construction Engineering and Inspection			15%	\$11,000
Construction Subtotal				\$81,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$14,000
Utility Relocation and Right-of-Way Cost ⁶				NOT INCLUDED
Subtotal				\$95,000
Total Estimated Project Cost (2019)⁷				\$100,000

Notes:

1. Raised channelizing island at the right-in, right-out gas station driveway along Rocky Ridge Road just north of the intersection.
2. Left turn phase for Rocky Ridge Road northbound and southbound approaches with a flashing yellow arrow (FYA) signal head arrangement for both left turn conditions. Includes the installation of two signal heads and 2" conduit.
3. The existing span wire connection should be converted to a box arrangement. Long term recommendations should be considered in the placement of any new signal poles. Rock excavation for signal pole installation is not expected. If traditional poles are not feasible or desired, poles with double mast arms could be used; however, this would increase the construction cost by \$75k to \$100k.
4. Pedestrian timings, signal heads, and crosswalks in accordance with the plans for sidewalks in the area will be done by others.
5. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
6. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements may require right-of-way acquisition and/or utility relocations.
7. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

<p>NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST. ALDOT'S INDIRECT COSTS ARE NOT INCLUDED IN THE ESTIMATED PROJECT COSTS.</p>
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Improvement Recommendations Opinion of Probable Cost

Rocky Ridge Road @ Dolly Ridge Road (Long Term)				
Item Description	Unit	Quantity	Unit Price	Amount
Clearing & Grubbing (\$4000/Acre) ¹	LS	1	\$4,000	\$4,000
Unclassified Excavation	CY	3600	\$15	\$54,000
Borrow Excavation	CY	2400	\$15	\$36,000
C&G Removal	LF	1000	\$20	\$20,000
Sidewalk (4") Removal	SY	80	\$25	\$2,000
Storm Pipe Removal	LF	1000	\$15	\$15,000
Storm Inlet Removal	EACH	8	\$500	\$4,000
Headwall Removal	EACH	4	\$500	\$2,000
Brick Wall Removal	LF	160	\$300	\$48,000
Retaining Wall Removal	LF	50	\$500	\$25,000
Remove Existing Signs ²	LS	1	\$500	\$500
Brick Sign Removal	EACH	1	\$600	\$600
Wearing Surface (1.5")	TON	80	\$90	\$7,200
Binder (2-2" layers)	TON	200	\$100	\$20,000
Aggregate Base (6")	SY	900	\$25	\$22,500
Tack Coat	GALLON	60	\$2	\$120
Curb & Gutter	LF	1000	\$20	\$20,000
Concrete Sidewalk (4")	SY	80	\$70	\$5,600
Storm Pipe	LF	1000	\$50	\$50,000
Storm Inlets	EACH	8	\$2,500	\$20,000
Pipe End Treatment	EACH	4	\$1,500	\$6,000
Structure Excavation	CY	500	\$15	\$7,500
Foundation Backfill	CY	250	\$30	\$7,500
Topsoil	CY	400	\$15	\$6,000
Seeding and Mulching	AC	1	\$2,400	\$2,400
Solid Sod	SY	830	\$8	\$6,640
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	260	\$4	\$1,040
Mailbox Reset	SF	2	\$200	\$400
Roadway Signs	EACH	40	\$30	\$1,200
Sign Post	LF	80	\$15	\$1,200
Signal Poles ³	EACH	4	\$5,000	\$20,000
Retaining Wall	SF	250	\$200	\$50,000
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$40,000	\$40,000
Subtotal				\$519,600
Contingency ⁴			25%	\$130,000
Construction Costs				\$650,000
Engineering Controls			1.3%	\$9,000
Mobilization			9.7%	\$64,000
Construction Engineering and Inspection			15%	\$109,000
Construction Subtotal				\$832,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$142,000
Utility Relocation and Right-of-Way Cost ⁵				NOT INCLUDED
Subtotal				\$974,000
ALDOT Indirect Costs			13.63%	\$133,000
Additional Cost Estimated For Long Term Project (2019)				\$1,110,000
Total Estimated Project Cost (2019)⁶				\$1,210,000

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

*See additional notes on following sheet

Rocky Ridge Road @ Dolly Ridge Road (Long Term)

Notes:

1. Clearing and grubbing includes clearing of trees in the right of way on Rocky Ridge and Dolly Ridge Roads.
2. Includes roadway and non-roadway signs.
3. Rock excavation for signal pole installation is not expected.
4. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
5. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
6. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

Improvement Recommendations Opinion of Probable Cost

Sicard Hollow Road @ Blue Lake Drive/Cahaba Heights Road (Short Term)				
Item Description	Unit	Quantity	Unit Price	Amount
Clearing and Grubbing (\$4000/Acre) ¹	LS	1	\$4,000	\$4,000
Roadway Signs	SF	100	\$30	\$3,000
Signs Posts	LF	150	\$15	\$2,250
Roadway Lighting ²	LS	1	\$150,000	\$150,000
Traffic Control	LS	1	\$10,000	\$10,000
Subtotal				\$169,250
Contingency ³			25%	\$43,000
Construction Costs				\$213,000
Engineering Controls			1.3%	\$3,000
Mobilization			9.7%	\$21,000
Construction Engineering and Inspection			15%	\$36,000
Construction Subtotal				\$273,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$47,000
Utility Relocation and Right-of-Way Cost ⁴				NOT INCLUDED
Subtotal				\$320,000
Total Estimated Project Cost (2019)⁵				\$320,000

Notes:

1. Clearing and Grubbing includes trimming vegetation to improve intersection sight distance.
2. Install lighting at the intersection to improve intersection visibility during nighttime conditions.
3. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
4. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
5. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST. ALDOT'S INDIRECT COSTS ARE NOT INCLUDED IN THE ESTIMATED PROJECT COSTS.

Improvement Recommendations Opinion of Probable Cost

Sicard Hollow Road @ Blue Lake Drive/Cahaba Heights Road (Long Term)				
Item Description	Unit	Quantity	Unit Price	Amount
Clearing & Grubbing (\$4000/Acre)	LS	1	\$8,000	\$8,000
Unclassified Excavation ¹	CY	9000	\$25	\$225,000
Borrow Excavation	CY	6000	\$15	\$90,000
Remove Concrete Median	SY	150	\$25	\$3,750
Remove Existing Signs	LS	1	\$500	\$500
Storm Pipe Remove	LF	200	\$15	\$3,000
Wearing Surface (1.5")	TON	200	\$90	\$18,000
Binder (2-2" layers)	TON	550	\$100	\$55,000
Aggregate Base (6")	SY	2450	\$25	\$61,250
Tack Coat	GALLON	150	\$2	\$300
Curb & Gutter	LF	1000	\$20	\$20,000
Concrete Apron and Islands	SY	270	\$250	\$67,500
Storm Pipe	LF	1000	\$50	\$50,000
Storm Inlets	EACH	8	\$2,500	\$20,000
Pipe End Treatment	EACH	8	\$1,500	\$12,000
Structure Excavation	CY	500	\$15	\$7,500
Foundation Backfill	CY	250	\$30	\$7,500
Topsoil	CY	250	\$15	\$3,750
Seeding and Mulching	AC	2	\$2,400	\$4,800
Solid Sod	SY	750	\$8	\$6,000
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	210	\$4	\$840
Signs	SF	100	\$30	\$3,000
Sign Posts	LF	150	\$15	\$2,250
Erosion Control	LS	1	\$20,000	\$20,000
Traffic Control	LS	1	\$50,000	\$50,000
Subtotal				\$743,140
Contingency ²			25%	\$186,000
Construction Costs				\$930,000
Engineering Controls			1.3%	\$13,000
Mobilization			9.7%	\$91,000
Construction Engineering and Inspection			15%	\$156,000
Construction Subtotal				\$1,190,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design) ³			25%	\$298,000
Utility Relocation and Right-of-Way Cost ⁴				NOT INCLUDED
Subtotal				\$1,488,000
ALDOT Indirect Costs			13.63%	\$203,000
Additional Cost Estimated For Long Term Project (2019)				\$1,700,000
Total Estimated Project Cost (2019)⁵				\$2,020,000

Notes:

1. Rock excavation is anticipated.
2. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
3. Increased percentage due to the complexity of roundabout design.
4. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
5. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

Improvement Recommendations Opinion of Probable Cost

Rocky Ridge Road @ Shades Crest Road and US-280 (Short Term)

Item Description	Unit	Quantity	Unit Price	Amount
Clearing & Grubbing (\$4000/Acre)	LS	1	\$4,000	\$4,000
Unclassified Excavation ¹	CY	6400	\$25	\$160,000
Borrow Excavation	CY	4300	\$15	\$64,500
Storm Pipe Remove	LF	850	\$15	\$12,750
Storm Inlet Remove	EACH	4	\$500	\$2,000
Wearing Surface (1.5")	TON	100	\$90	\$9,000
Binder (2-2" layers)	TON	200	\$100	\$20,000
Aggregate Base (6")	SY	800	\$25	\$20,000
Tack Coat	GALLON	60	\$2	\$120
Curb & Gutter	LF	850	\$20	\$17,000
Storm Pipe	LF	850	\$50	\$42,500
Storm Inlets	EACH	6	\$2,500	\$15,000
Pipe End Treatment	EACH	2	\$1,500	\$3,000
Structure Excavation	CY	500	\$15	\$7,500
Foundation Backfill	CY	250	\$30	\$7,500
Topsoil	CY	500	\$15	\$7,500
Seeding and Mulching	AC	1	\$2,400	\$2,400
Solid Sod	SY	2000	\$8	\$16,000
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	400	\$4	\$1,600
Roadway Signs	SF	60	\$30	\$1,800
Sign Posts	LF	60	\$15	\$900
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$40,000	\$40,000
Subtotal				\$468,270
Contingency ²			25%	\$118,000
Construction Costs				\$587,000
Engineering Controls			1.3%	\$8,000
Mobilization			9.7%	\$57,000
Construction Engineering and Inspection			15%	\$98,000
Construction Subtotal				\$750,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$128,000
Utility Relocation and Right-of-Way Cost ³				NOT INCLUDED
Subtotal				\$878,000
ALDOT Indirect Costs			13.63%	\$120,000
Total Estimated Project Cost (2019)⁴				\$1,000,000

Notes:

1. Rock excavation is likely.
2. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
3. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
4. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

Improvement Recommendations Opinion of Probable Cost

US-31 @ Shades Crest Road (Short Term)				
Item Description	Unit	Quantity	Unit Price	Amount
Convert Left Turn Phase ¹	LS	1	\$11,000	\$11,000
Traffic Control	LS	1	\$10,000	\$10,000
Subtotal				\$21,000
Contingency ²			25%	\$6,000
Construction Costs				\$27,000
Engineering Controls			1.3%	\$1,000
Mobilization			9.7%	\$3,000
Construction Engineering and Inspection			15%	\$5,000
Construction Subtotal				\$36,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$7,000
Utility Relocation and Right-of-Way Cost ³				NOT INCLUDED
Subtotal				\$43,000
Total Estimated Project Cost (2019)⁴				\$50,000

Notes:

1. Convert US-31 northbound left turn phase to protected-only.
2. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
3. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
4. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST. ALDOT'S INDIRECT COSTS ARE NOT INCLUDED IN THE ESTIMATED PROJECT COSTS.

Improvement Recommendations Opinion of Probable Cost

US-31 @ Shades Crest Road (Long Term)

Item Description	Unit	Quantity	Unit Price	Amount
Clearing & Grubbing (\$4000/Acre)	LS	1	\$4,000	\$4,000
Unclassified Excavation	CY	4800	\$15	\$72,000
Borrow Excavation	CY	3200	\$15	\$48,000
Storm Pipe Removal	LF	150	\$15	\$2,250
Headwall Removal	EACH	4	\$500	\$2,000
Brick Sign Removal	EACH	3	\$600	\$1,800
Wearing Surface (1.5")	TON	80	\$90	\$7,200
Binder (2-2" layers)	TON	800	\$100	\$80,000
Aggregate Base (6")	SY	900	\$25	\$22,500
Tack Coat	GALLON	60	\$2	\$120
Concrete Apron and Islands	SY	375	\$250	\$93,750
Curb and Gutter	LF	200	\$20	\$4,000
Storm Pipe	LF	180	\$50	\$9,000
Storm Inlet	EACH	2	\$2,500	\$5,000
Pipe End Treatment	EACH	4	\$1,500	\$6,000
Structure Excavation	CY	100	\$15	\$1,500
Foundation Backfill	CY	50	\$30	\$1,500
Topsoil	CY	350	\$15	\$5,250
Seeding and Mulching	AC	1	\$2,400	\$2,400
Solid Sod	SY	750	\$8	\$6,000
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	450	\$4	\$1,800
Roadway Signs	SF	30	\$30	\$900
Sign Posts	LF	50	\$15	\$750
Mail Box Reset	EACH	1	\$200	\$200
Flashing Yellow Arrow (FYA)	LS	1	\$11,000	\$11,000
Signal Poles ²	EACH	4	\$5,000	\$20,000
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$80,000	\$80,000
Subtotal				\$502,120
Contingency ³			25%	\$126,000
Construction Costs				\$629,000
Engineering Controls			1.3%	\$9,000
Mobilization			9.7%	\$62,000
Construction Engineering and Inspection			15%	\$105,000
Construction Subtotal				\$805,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$137,000
Utility Relocation and Right-of-Way Cost ⁴				NOT INCLUDED
Subtotal				\$942,000
ALDOT Indirect Costs			13.63%	\$129,000
Additional Cost Estimated For Long Term Project (2019)				\$1,080,000
Total Estimated Project Cost (2019)⁵				\$1,130,000

Notes:

- Dual widening was assume for both both Shades Crest Rd approaches to US-31. Six feet on each side for additional turn lane.
- Cost for installing new signal poles is included since widening of Shades Crest may impact existing pole locations. Rock excavation for signal pole installation is not expected.
- Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
- Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
- The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

Improvement Recommendations Opinion of Probable Cost

US-31 @ Columbiana Road/I-65 Northbound Ramps				
Item Description	Unit	Quantity	Unit Price	Amount
Pavement Removal	SY	850	\$25	\$21,250
Milling	SY	1800	\$5	\$9,000
Wearing Surface (1.5")	TON	150	\$90	\$13,500
Tack Coat	GALLON	110	\$2	\$220
Concrete Islands (6")	CY	2	\$250	\$500
Curb and Gutter	LF	950	\$20	\$19,000
Storm Pipe	LF	200	\$50	\$10,000
Storm Pipe End Treatment	EACH	2	\$1,500	\$3,000
Structure Excavation	CY	200	\$15	\$3,000
Foundation Backfill	CY	100	\$30	\$3,000
Topsoil	CY	150	\$15	\$2,250
Solid Sod	SY	850	\$8	\$6,800
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	600	\$4	\$2,400
Roadway Signs	SF	50	\$30	\$1,500
Sign Posts	LF	75	\$15	\$1,125
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$60,000	\$60,000
Subtotal				\$169,745
Contingency ¹			25%	\$43,000
Construction Costs				\$213,000
Engineering Controls			1.3%	\$3,000
Mobilization			9.7%	\$21,000
Construction Engineering and Inspection			15%	\$36,000
Construction Subtotal				\$273,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$47,000
Utility Relocation and Right-of-Way Cost ²				NOT INCLUDED
Subtotal				\$320,000
ALDOT Indirect Costs			13.63%	\$44,000
Total Estimated Project Cost (2019)³				\$370,000

Notes:

1. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
2. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
3. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

Improvement Recommendations Opinion of Probable Cost

Columbiana Road @ Shades Crest Road/Vestaview Lane				
Item Description	Unit	Quantity	Unit Price	Amount
Clearing and Grubbing (\$4000/Acre)	LS	1	\$4,000	\$4,000
Unclassified Excavation	CY	2000	\$15	\$30,000
Borrow Excavation	CY	1400	\$15	\$21,000
Pavement Removal	SY	700	\$25	\$17,500
Wearing Surface (1.5")	TON	50	\$90	\$4,500
Binder (2-2" layers)	TON	110	\$100	\$11,000
Aggregate Base (6")	SY	500	\$25	\$12,500
Tack Coat	GALLON	30	\$2	\$60
Concrete Islands (6")	CY	6	\$250	\$1,500
Concrete Sidewalk (4")	SY	100	\$70	\$7,000
Topsoil	CY	150	\$15	\$2,250
Solid Sod	SY	850	\$8	\$6,800
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	600	\$4	\$2,400
Roadway Signs	SF	20	\$30	\$600
Sign Posts	LF	50	\$15	\$750
Pedestrian Signal Heads w/ Countdown Display	LS	1	\$15,000	\$15,000
Signalization ¹	LS	1	\$150,000	\$150,000
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$60,000	\$60,000
Subtotal				\$356,060
Contingency ²			25%	\$90,000
Construction Costs				\$447,000
Engineering Controls			1.3%	\$6,000
Mobilization			9.7%	\$44,000
Construction Engineering and Inspection			15%	\$75,000
Construction Subtotal				\$572,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$98,000
Utility Relocation and Right-of-Way Cost ³				NOT INCLUDED
Subtotal				\$670,000
ALDOT Indirect Costs			13.63%	\$92,000
Total Estimated Project Cost (2019)⁴				\$770,000

Notes:

1. Cost of signalization only necessary if the city opts for signalization of the northern intersection of Columbiana Road and Shades Crest Road. Rock excavation for signal pole installation is not expected.
2. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
3. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
4. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

Improvement Recommendations Opinion of Probable Cost

US-31 @ Vestavia Plaza/City Hall				
Item Description	Unit	Quantity	Unit Price	Amount
Unclassified Excavation	CY	40	\$15	\$600
Borrow Excavation	CY	30	\$15	\$450
Concrete Sidewalk (4")	SY	330	\$70	\$23,100
Curb and Gutter	LF	150	\$20	\$3,000
Storm Pipe	LF	150	\$50	\$7,500
Storm Inlet	EACH	2	\$2,500	\$5,000
Structure Excavation	CY	80	\$15	\$1,200
Foundation Backfill	CY	40	\$30	\$1,200
Topsoil	CY	10	\$15	\$150
Solid Sod	SY	330	\$8	\$2,640
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	800	\$4	\$3,200
Pedestrian Signal Head Pedastals w/ Countdown Display	LS	1	\$21,000	\$21,000
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$50,000	\$50,000
			Subtotal	\$132,240
Contingency ¹			25%	\$34,000
			Construction Costs	\$167,000
Engineering Controls			1.3%	\$3,000
Mobilization			9.7%	\$17,000
Construction Engineering and Inspection			15%	\$29,000
			Construction Subtotal	\$216,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$37,000
Utility Relocation and Right-of-Way Cost ²				NOT INCLUDED
			Subtotal	\$253,000

Total Estimated Project Cost (2019)³ \$260,000

Notes:

1. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
2. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
3. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

<p>NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST. ALDOT'S INDIRECT COSTS ARE NOT INCLUDED IN THE ESTIMATED PROJECT COST.</p>
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Improvement Recommendations Opinion of Probable Cost

US-31 @ Pizitz Drive				
Item Description	Unit	Quantity	Unit Price	Amount
Unclassified Excavation	CY	80	\$15	\$1,200
Borrow Excavation	CY	50	\$15	\$750
Concrete Sidewalk (4")	SY	80	\$70	\$5,600
Concrete Island (6")	CY	20	\$250	\$5,000
Curb and Gutter	LF	150	\$20	\$3,000
Storm Pipe	LF	150	\$50	\$7,500
Storm Inlet	EACH	3	\$2,500	\$7,500
Structure Excavation	CY	80	\$15	\$1,200
Foundation Backfill	CY	40	\$30	\$1,200
Topsoil	CY	15	\$15	\$225
Solid Sod	SY	80	\$8	\$640
Traffic Stripe	MILE	1	\$3,200	\$3,200
Remove Traffic Stripe	MILE	1	\$2,725	\$2,725
Traffic Markings, & Legends	SF	350	\$4	\$1,400
Pedestrian Signal Head Pedastals w/ Countdown Display	LS	1	\$15,000	\$15,000
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$50,000	\$50,000
Subtotal				\$116,140
Contingency ¹			25%	\$30,000
Construction Costs				\$147,000
Engineering Controls			1.3%	\$2,000
Mobilization			9.7%	\$15,000
Construction Engineering and Inspection			15%	\$25,000
Construction Subtotal				\$189,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design)			17%	\$33,000
Utility Relocation and Right-of-Way Cost ²				NOT INCLUDED
Subtotal				\$222,000

Total Estimated Project Cost (2019)³ \$230,000

Notes:

1. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
2. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
3. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST. ALDOT'S INDIRECT COSTS ARE NOT INCLUDED IN THE OVERALL PROJECT COST.

Improvement Recommendations Opinion of Probable Cost

Dolly Ridge Road @ Gresham Drive				
Item Description	Unit	Quantity	Unit Price	Amount
Clearing & Grubbing (\$4000/Acre) ¹	LS	1	\$4,000	\$4,000
Unclassified Excavation	CY	5800	\$15	\$87,000
Borrow Excavation	CY	3900	\$15	\$58,500
Milling	SY	5350	\$5	\$26,750
Wearing Surface (1.5")	TON	550	\$90	\$49,500
Binder (2-2" layers)	TON	300	\$100	\$30,000
Aggregate Base (6")	SY	1500	\$25	\$37,500
Tack Coat	GALLON	400	\$2	\$800
Topsoil	CY	750	\$15	\$11,250
Seeding and Mulching	AC	1	\$2,400	\$2,400
Traffic Stripe	MILE	1	\$3,200	\$3,200
Traffic Markings, & Legends	SF	500	\$4	\$2,000
Roadway Signs	SF	50	\$30	\$1,500
Sign Post	LF	150	\$15	\$2,250
Signal Timing Adjustment ²	LS	1	\$1,000	\$1,000
Erosion Control	LS	1	\$10,000	\$10,000
Traffic Control	LS	1	\$20,000	\$20,000
Subtotal				\$347,650
Contingency ³			25%	\$87,000
Construction Costs				\$435,000
Engineering Controls			1.3%	\$6,000
Mobilization			9.7%	\$43,000
Construction Engineering and Inspection			15%	\$73,000
Construction Subtotal				\$557,000
Preliminary Engineering (Environmental, Survey, Geotech, Traffic, Design) ⁴			17%	\$95,000
Utility Relocation and Right-of-Way Cost ⁵				NOT INCLUDED
Subtotal				\$652,000
ALDOT Indirect Costs			13.63%	\$89,000
Total Estimated Project Cost (2019)⁶				\$750,000

Notes:

1. Clearing and grubbing includes trimming vegetation that is blocking Dolly Ridge Road eastbound drivers' view of the signal heads at the intersection of Gresham Drive.
2. Implement base signal timings. This does not include periodic monitoring of detection.
3. Contingency cost includes miscellaneous and/or unknown items that can not be quantified at the time this study was conducted.
4. Internal school circulation plan is not included in the Preliminary Engineering fee.
5. Right-of-Way and Utility Relocation were not included in this estimate; however, some improvements will require right-of-way acquisition and/or utility relocations.
6. The total estimated project cost was prepared for the 2019 planning year. This number should be increased to account for rising costs due to inflation should the improvements not be implemented in 2019.

NOTE: ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST PROVIDED IS MADE ON THE BASIS OF ENGINEER'S EXPERIENCES AND QUALIFICATION AND REPRESENTS ENGINEER'S BEST JUDGMENT WITHIN THE INDUSTRY. ENGINEER DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR ACTUAL COST WILL NOT VARY FROM ENGINEER'S OPINION OF PROBABLE COST.

ORDINANCE NUMBER 3098

AN ORDINANCE TO FURTHER AMEND THE ZONING ORDINANCE AND THE ZONING MAP OF THE CITY OF VESTAVIA HILLS, ALABAMA, ADOPTED SEPTEMBER 16, 1985, AND AS LAST AMENDED SO AS TO CHANGE THE CLASS OF DISTRICT ZONING OF PROPERTY FROM VESTAVIA HILLS R-1 TO VESTAVIA HILLS B-3 WITH A CONDITIONAL USE FOR VETERINARY SERVICES, GROOMING AND BOARDING OF DOGS

BE IT ORDAINED by the City Council of the City of Vestavia Hills, Alabama, as follows: That the Zoning Ordinance and Zoning Map of the City of Vestavia Hills, Alabama, adopted September 16, 1985, and as last amended so as to change the class of district zoning of the following described property from Vestavia Hills R-1 (low density residential) to Vestavia Hills B-3 (conditional business district):

4538 Pine Tree Circle
Lot 43, Topfield Subdivision
Adam J. and Katherine A. McLaurin

BE IT FURTHER ORDAINED, that a conditional use for veterinary care, grooming and/or boarding of dogs is approved for 4538 Pine Tree Circle, Lot 43, Topfield Subdivision under the following conditions:

1. Zoning is conditioned upon the lot being surveyed to include the existing Pawms property to create a single lot. Said plat shall be recorded in the Jefferson County Probate Office and a copy returned to the City Clerk prior to zoning becoming effective; and
2. Building to be construed with STC sound rating for exterior walls; and
3. If the property use as a veterinary clinic, grooming and/or boarding of dogs ceases or is vacated at any time for a period of more than 12 months, said conditional use is hereby voided.

APPROVED and ADOPTED this the 23rd day of May, 2022.

Ashley C. Curry
Mayor

ATTESTED BY:

Rebecca Leavings
City Clerk

CERTIFICATION:

I, Rebecca Leavings, as City Clerk of the City of Vestavia Hills, Alabama, hereby certify that the above and foregoing copy of 1 (one) Ordinance # 3098 is a true and correct copy of such 23rd day of May, 2022, as same appears in the official records of said City.

Posted at Vestavia Hills City Hall, Vestavia Hills Library in the Forest, New Merkle House and Vestavia Hills Recreational Center this the _____ day of _____, 2022.

Rebecca Leavings
City Clerk

CITY OF VESTAVIA HILLS
SYNOPSIS AND STAFF RECOMMENDATION CONCERNING
APPLICATION BEFORE THE PLANNING AND ZONING COMMISSION

Date: APRIL 14, 2022

- **CASE:** P-0422-09
- **REQUESTED ACTION:** from Vestavia Hills R-1 to Vestavia Hills B-3 With A Conditional Use For Animal Boarding
- **ADDRESS/LOCATION:** 4538 Pine Tree Cir.
- **APPLICANT/OWNER:** Adam J. & Katherine A. McLaurin
- **REPRESENTING AGENT:** Engineering Design Group
- **GENERAL DISCUSSION:** Applicant is seeking rezoning and Conditional Use to expand the current Pawms pet boarding facility. The proposed building would be 5,710 sq. ft. with 14 parking spaces, exceeding the zoning requirements. The owner will also construct a sidewalk along the front. A connecting sidewalk between the two buildings would also be constructed. A site plan is attached.

Like the first facility would have no outdoor kennels but instead play in an indoor courtyard in the center of the facility. As required by the zoning ordinance, kennels require conditional use approval. Both lots would be combined if approved.

CAHABA HEIGHTS COMMUNITY PLAN: The request is consistent with the Cahaba Heights Community Plan for limited mixed use.

- **STAFF REVIEW AND RECOMMENDATION:**
 1. **City Planner Review:** I have looked at all of the relevant zoning / subdivision requirements related to this proposal, including application, notification, setbacks, area of lot development, etc. Notification has been sent to property owners pursuant to Alabama law. I have reviewed this request and find it does meet the minimum requirements of the proposed zoning.

City Planner Recommendation:
 - A. Zoning contingent on lots being resurveyed.
 - B. Strongly encourage high STC sound rating for exterior walls
 2. **City Engineer Review:** Will continue to evaluate based on Timberlake Dr. improvements.

3. **City Fire Marshal Review:** I have reviewed the application and I have no issues with this request.
4. **Building Safety Review:** I have reviewed the application and I have no issues with this request.

With the Commission finding that the application met all nine criteria as defined in Section 13.3.4 of the Vestavia Hills Zoning Ordinance

MOTION Ms. Barnes made a motion to recommend Rezoning for 4538 Pine Tree Dr. from R-1 to B-3 with a Conditional Use Approval for a animal boarding with the following conditions:

1. Zoning contingent on lots being resurveyed.
2. Building to be constructed with STC sound rating for exterior walls

Second was by Mr. Romeo. Motion was carried on a roll call; vote as follows:

Mr. Honeycutt – yes	Mr. Farrell – yes
Ms. Barnes – yes	Mr. Larson – yes
Mr. Romeo – yes	Mr. Maloof– yes
Mr. Vercher– yes	

Motion carried.

CITY OF VESTAVIA HILLS

APPLICATION

PLANNING AND ZONING COMMISSION

I. INSTRUCTIONS AND INFORMATION:

- (1) The Vestavia Hills Planning and Zoning Commission meets regularly on the second Thursday of each month at 6:00 PM in Council Chambers at the Municipal Center.
- (2) All materials and information relating to a zoning/rezoning request or conditional use approval before the Planning and Zoning Commission must be submitted to the Office of the City Clerk no later than **25 working days prior to the scheduled meeting at which it shall be considered.** All information relating to Preliminary Map approvals must be submitted to the Office of the City Clerk no later than 20 days prior to the scheduled meeting at which is shall be considered. All information relating to Final Map approvals must be submitted to the Office of the City Clerk no later than 15 days prior to the scheduled meeting at which it is to be considered.
- (3) This application must be filled out in its entirety complete with zip codes.
- (4) All applicable fees shall accompany this application prior to its being considered complete. Fees include an application fee of \$100.00 along with applicable postage per property owner to be notified for Commission meeting. Fees may also include notification fees for City Council meeting and publication fees which will be billed to applicant at a later date. ***No permits will be issued until all fees have been paid.*
- (5) Appropriate plats and maps with proper legal description shall accompany this application. **Please refer to attached checklist.**

II. APPLICANT INFORMATION: (owner of property)

NAME: Adam J and Katherine A McLaurin

ADDRESS: 4538 Pine Tree Circle, Vestavia Hills, Alabama 35243

MAILING ADDRESS *(if different from above)* _____

PHONE NUMBER: Home 205-356-6051

Office _____

EMAIL ADDRESS: AJMC28@Hotmail.com

NAME OF REPRESENTING ATTORNEY/AGENT & CONTACT INFORMATION:

III. ACTION REQUESTED

Request that the above described property be zoned/rezoned

From: R-1

To: B-3 with a conditional use to allow an enclosed outdoor exercise area for s

For the intended purpose of: Small dog and cat boarding, grooming, daycare
and vet care

small dogs

(Example: From "VH R-1" to "VH O-1" for office building)

if additional information is needed, please attached full description of request

IV. PROPERTY DESCRIPTION: (address, legal, etc.)

4538 Pine Tree Circle, Vestavia Hills, AL 35243

Lot 43 on the attached survey

Property size: 144 feet X 145 feet. Acres: 0.55

V. INFORMATION ATTACHED:



Attached Checklist complete with all required information.



Application fees submitted.

VI. I do hereby declare the above statements are true and that I am the owner and myself or my duly appointed representative will be at the scheduled hearing.

[Signature]
Owner Signature/Date

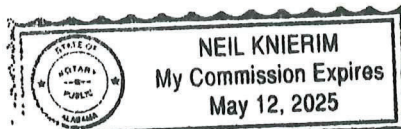
13-8-2022

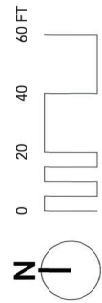
Representing Agent (if any)/date

Given under my hand and seal
this 8 day of Merch, 2022.

Neil Alan Knierim
Notary Public

My commission expires _____
day of _____, 20____.





Zoning



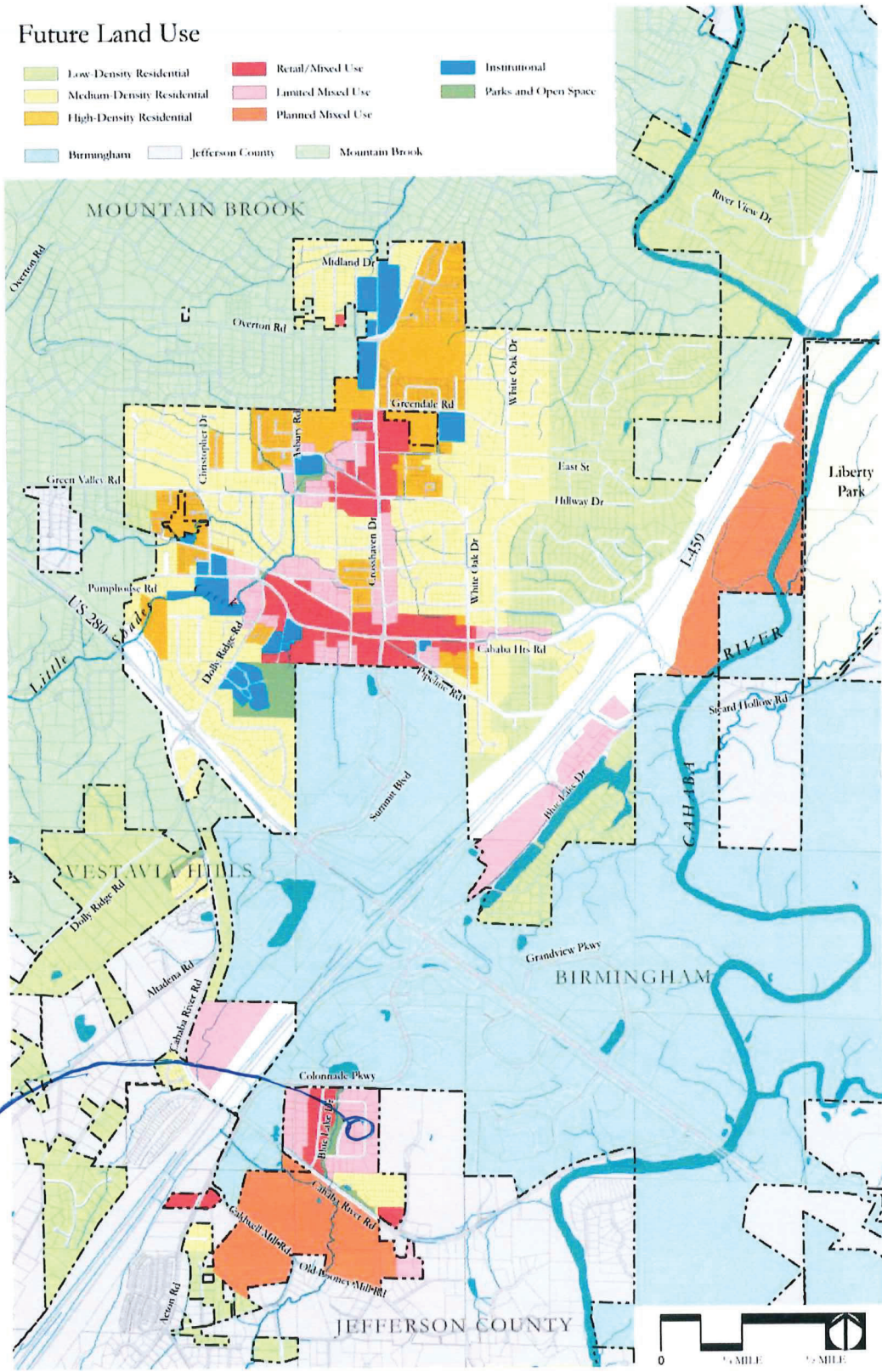
Zoning1

PARCELID	2800274003005000
DISTRICT	020
ESN_NUM	62
PROPADD	4528 PINE TREE CIR
TAX_TOWNSH	28
SECTION	27
QSECTION	4
BLOCK	003
PARCEL	005000
VH_ZONING	R-1
ZNG_ORD	1981
ZNG_ORD_DT	03/21/2003
ZNG_ORD2	

Zoom to

Future Land Use

- | | | |
|--|---|--|
|  Low-Density Residential |  Retail/Mixed Use |  Institutional |
|  Medium-Density Residential |  Limited Mixed Use |  Parks and Open Space |
|  High-Density Residential |  Planned Mixed Use | |
|  Birmingham |  Jefferson County |  Mountain Brook |



Subject Parcel

Figure 4: Future Land Use Map

ORDINANCE NUMBER 3099

AN ORDINANCE TO REPEAL ORDINANCE NUMBERS 2331, 2331-A and 2331-B AND APPENDIX A, VESTAVIA HILLS CODE OF ORDINANCES AND TO ESTABLISH THE ZONING CODE OF THE CITY OF VESTAVIA HILLS, ALABAMA

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF VESTAVIA HILLS, ALABAMA, AS FOLLOWS:

1. Ordinance Numbers 2331, 2331-A and 2331-B, and Appendix A, Vestavia Hills Code of Ordinances, are hereby repealed in its entirety and the Zoning Code of the City of Vestavia Hills, Alabama, is hereby adopted, approved and amended to read, in its entirety, as follows:

CITY OF VESTAVIA HILLS

ZONING ORDINANCE



Adopted: May 25, 2022

CITY OF VESTAVIA HILLS, ALABAMA

2022

Mayor

Ashley C. Curry

Vestavia Hills City Council

Rusty Weaver, Mayor Pro-Tempore

Kimberly Cook

Paul Head

George Pierce

Vestavia Hills Planning and Zoning Commission

Michael Vercher, Chair

Lyle Larson

David Maluff

Jonathan Romeo

Hasting Sykes

Erica Barnes

Rick Honeycutt

Rusty Weaver

Ryan Farrell

Rebecca Leavings, City Clerk

Keith Blanton, Director, Department of Building Safety

Christopher Brady, City Engineer

Conrad Garrison, City Planner

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Article 1 GENERAL PROVISIONS

§1.1. Legislative Intent and Purpose

Pursuant to Title 11-52-70, Code of Alabama, 1975, (Acts 1923, No. 443, pg. 590; Code 1923, Section 1878; Code of Alabama, 1949, Title 37, Section 772) each municipal corporation in the State of Alabama may divide the territory within its corporate limits into business, industrial and residential zones or districts and may provide the kind, character and use of structures and improvements that may be erected or made within the several zones or districts established and may, from time to time, rearrange or alter the boundaries of such zones or districts and may also adopt such ordinances as necessary to carry into effect and make effective the provisions of said Title 11-52-70.

By virtue of that authority, the City of Vestavia Hills, Alabama, hereinafter referred to as “the City”, adopted Ordinance Number 28 on December 2, 1953, regulating the general use of private land. It established districts and outlined the intended use for each said zone or district. Ordinance Number 28 became known as the Zoning Code for the City. Said Code, including revisions, has been reprinted several times since 1953.

§1.2. Application of Regulations

No building, structure, or land shall hereafter be used or occupied, and no building, structure or part thereof shall hereafter be erected, constructed, reconstructed, moved, or structurally altered unless in conformity with all the regulations of this ordinance for the district in which it is located except as otherwise provided for legal nonconformities pursuant to [Article 10](#). All construction shall be done in strict compliance with the City Building Code, Fire Code, Plumbing Code, Subdivision Regulations, and Electrical Code, as adopted by the City.

§1.3. Short Title

This Ordinance shall be known as the “Zoning Ordinance of the City of Vestavia Hills, Alabama”, and the map herein referred to, which is identified by the title “City of Vestavia Hills, Alabama, Zoning Map”, dated January 1, 1962 and as amended, shall be known as the “Zoning Map of the City of Vestavia Hills, Alabama,” hereinafter referred to as “the Zoning Map”. Said map and all explanatory matter thereon is hereby adopted and made a part of this Ordinance, as aforesaid.

§1.4. Organization

1.4.1. This Ordinance is organized as follows:

1. For purposes of organization, this Zoning Ordinance, is divided into fourteen (14) Articles. The Article designation number represents the first digit (or two as the case may be) of that series of numbers used to identify the respective regulations of the Ordinance; e.g., in the reference number §1.2.3.4, the digit “1” represents the Article.
2. Each Article is subdivided into several major headings known as Sections, which are represented by the second digit; e.g., in the reference number §1.2.3.4, the digit “2” represents the Section.
3. Each Section is subdivided into Subsections, which are represented by the digit(s) following the Section designation number; e.g., in the reference number §1.2.3.4 the digit “3” represents the Subsection.
4. Each Subsection may be subdivided into Paragraphs, which are represented by the digit following the Subsection designation; e.g., in the reference number §1.2.3.4 the digit “4” represents the Paragraph.

5. Each Paragraph may be subdivided into Items, which are represented by the lower-case letter following the Paragraph designation; which may then be further subdivided as (1), (2), (3)... (a), (b), (c)...and (i), (ii), (iii)...
- 1.4.2. Internal Referencing. All references to Articles, Sections, Subsections, Paragraphs and Items within this Ordinance shall refer to Articles, Sections, Subsections, Paragraphs and Items in this Ordinance unless otherwise specified. When an Article, Section or other subdivision is referenced within a provision or requirement of this Ordinance, unless otherwise specified, all subdivisions within such reference shall be assumed to be applicable.
- 1.4.3. Page Numbering. Each Article contains its own separate page numbering system. The page numbers are prefixed by the respective Article number. As an example, page 10 of Article 8 is designated page 8-10.

Article 2 GLOSSARY

For the purposes of this Ordinance, certain words and terms are defined as herein indicated and shall apply to all parts of this Ordinance unless otherwise specified.

§2.1. General Definitions.

Unless specifically defined herein, words or phrases used in this Ordinance shall be interpreted so as to give them the same meaning as they have in common usage and so as to give this Ordinance its most reasonable application. All words used in the present tense shall include the future tense, all words in the singular number shall include the plural number, and all words in the plural number shall include the singular number, unless the natural construction of the wording indicates otherwise. The words “used for” shall include the meaning “designed for”, and the word “structure” shall include the word “building”. The word “lot” shall include the words “plot” and “tract” and the word “shall” is mandatory.

- 2.1.1. *Abutting*. Touching at one point or along a common side, boundary or property line. Two properties separated by a street or right-of-way are “Adjacent”, but not “Abutting”. However, for purposes of annexation, two properties separated by a street or right-of-way are considered contiguous and therefore eligible for annexation.
- 2.1.2. *Access Management*. The process of providing and managing vehicular access from public streets to private development while preserving the flow of traffic in terms of safety, capacity, and speed.
- 2.1.3. *Accessory Structure*. A subordinate structure or a portion of the principal structure, the use of which is incidental to the principal use of the premises, including any detached minor building

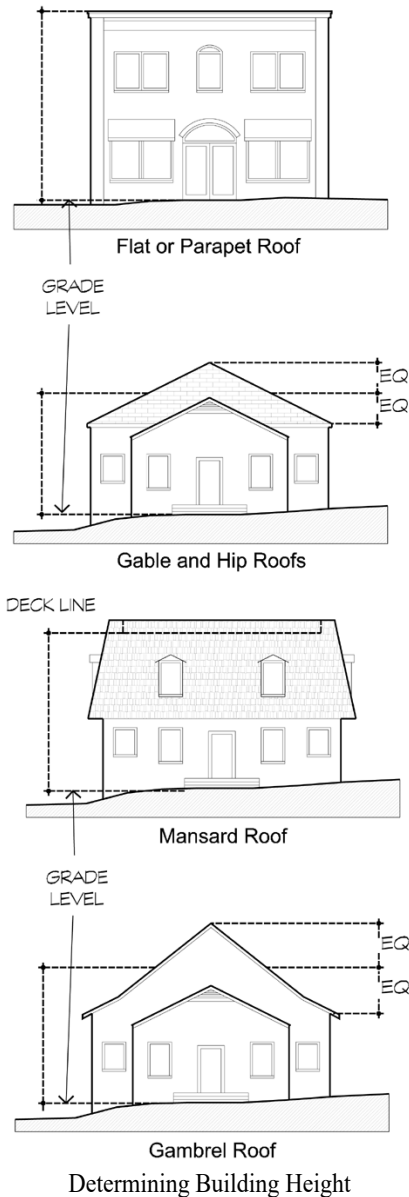
consisting of masonry or frame walls and roof, at least one story in height or other type of structure necessary as an adjunct to the use and occupancy of a principal structure, except open structures such as pergolas, arbors and other garden houses of similar character. The term “Accessory Structure” shall also include children’s playhouses, tree houses, storage houses built on skids and on permanent foundations and any other Structure not expressly exempted in this Section.

- 2.1.4. *Accessory Use*. A use which is incidental to and customarily found in connection with the principal use of the premises.
- 2.1.5. *Adjacent*. Either abutting or on the opposite side of a common street, right-of-way, or easement that separates it from the subject property. However, properties separated by a freeway or railroad ROW shall not be considered “Adjacent”.
- 2.1.6. *Alley*. A public or private right-of-way or easement, on which no parcel fronts, providing access for two (2) or more properties along the side or rear of said properties.
- 2.1.7. *Alteration and Altered*. The word “Alteration: shall include any of the following:
 - 1. Any addition to the height or depth of a building or structure.
 - 2. Any change in the location of any exterior walls of a building or structure.
 - 3. Any increase in the interior accommodations of a building or structure.

In addition to the foregoing, a building or structure shall be classified as altered when it is repaired, renovated, remodeled, or rebuilt at a cost in excess of fifty (50) percent of its value prior to

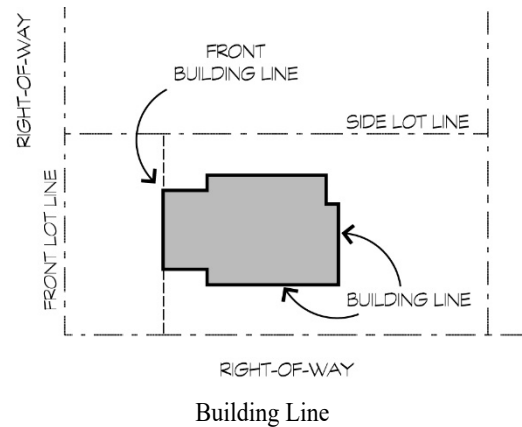
- the commencement of such repairs, renovation, remodeling, or rebuilding.
- 2.1.8. *Applicable District.* That zoning district in which a structure, subdivision or property is located or proposed to be located.
- 2.1.9. *Applicant.* A landowner, including his heirs, successors and assignees, or developer authorized to represent a property for which an application for development has been filed.
- 2.1.10. *Application for Development or Application.* Any application required to be filed and accepted prior to start of construction or development including, but not limited to, an application for a building, design review, or sign permit; for the approval of a subdivision plat or plan; or for the acceptance of a development plan.
- 2.1.11. *Basement.* A story partly or wholly underground. For purposes of height measurement a basement shall be counted as a story when more than one-half (1/2) of its height is above grade level.
- 2.1.12. *Best Management Practices, Stormwater.* A collection of structural practices and vegetative measures which, when properly designated, installed and maintained, will provide effective erosion and sedimentation control for all rainfall events.
- 2.1.13. *Block.* A unit of land bounded by streets or a combination of streets, public land, public parks, cemeteries, railroad rights-of-way, watercourses, or any other barrier to the continuity of development.
- 2.1.14. *Board of Zoning Adjustment.* The Board of Zoning Adjustment of the City of Vestavia Hills, Alabama established pursuant to the provisions of [Article 12](#) and through which, the Board considers requests for variances and special exceptions and hears appeals to decisions of city staff in regard to this Zoning Ordinance.
- 2.1.15. *Buffer.* A landscaped strip of land provided between two or more properties, uses, or buildings to mitigate the incompatible characteristics of adjacent uses and/or buildings. Buffers may include berms, shrubs, trees, fences or walls, other screening devices, or a combination of such devices as required by [§9.3 Buffers](#).
- 2.1.16. *Build-to Line.* A line parallel to the front lot line establishing the furthest distance a building may be built from such lot line.
- 2.1.17. *Building.* Any structure, consisting of a foundation, walls or supports and roof with or without other parts, constructed or used for a residence, business, industry, or other public or private purpose, or accessory thereto, and including greenhouses, stables, garages, roadside stands, manufactured homes, and similar structures, whether stationary or movable, but excluding recreational vehicles/travel trailers, fences, walls, signs and awnings. Features which are structurally essential and connected to the structure shall be considered as part of the structure within the meaning of this Zoning Ordinance.
- 2.1.18. *Building Area.* The portion of the lot occupied by the main building, accessory buildings, other structures and impervious surfaces.
- 2.1.19. *Building Code.* The code(s) adopted by the City, and as may be amended from time to time by the Council, which governs the design and construction of buildings and structures, including fire, plumbing and electrical codes.

2.1.20. *Building Height.* The vertical distance measured from the finished grade level at the front of the building to the deck line for mansard roofs, to the uppermost point of the parapet wall for flat roofs, and to the average height between eaves and ridges for gable, hip, and gambrel roofs.



2.1.21. *Building Line.* The perimeter of that portion of a building or structure nearest a lot line, but excluding open steps, terraces, cornices, and other ornamental

features projecting from the walls of the building or structure.



2.1.22. *Building Official.* An official of the City of Vestavia Hills Department of Building Safety designated to administer and enforce the City Building Code and applicable provisions of this Zoning Ordinance.

2.1.23. *Caliper.* The trunk diameter of a tree measured six inches above grade level.

2.1.24. *Certificate of Occupancy.* A certificate issued by the Department of Building Safety, with approval of the Fire Marshal, upon completion of a new building or upon a change or conversion of the structure or use of a building, which certifies that all requirements and regulations as provided herein and within all other applicable requirements, have been complied with.

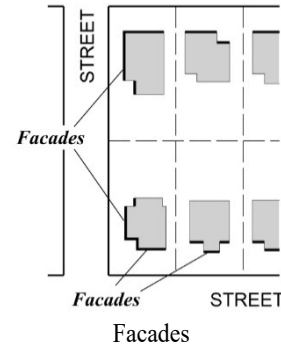
2.1.25. *City, The.* The City of Vestavia Hills, Alabama unless otherwise indicated by context.

2.1.26. *City Council or Council.* The City Council of the City of Vestavia Hills, Alabama.

2.1.27. *City Engineer.* A registered professional engineer, licensed by the State of Alabama, and employed by the City of Vestavia Hills or engaged as a consultant by the City.

- 2.1.28. *City Fire Code or Fire Code.* An ordinance adopted by the City providing standards for fire safety and as may be modified from time to time by the City Council.
- 2.1.29. *City Planning Staff.* Municipal staff designated to review development plans, including the Zoning Official/City Clerk, Fire Marshal, City Engineer, Building Official and others as needed.
- 2.1.30. *Clear Sight Triangle.* See "Sight Triangle, Clear".
- 2.1.31. *Commercial Vehicle.* Any motor vehicle licensed by the state as a commercial vehicle.
- 2.1.32. *Commission, The.* See "Planning Commission".
- 2.1.33. *Comprehensive Plan.* The official public document prepared in accordance with §11-52-8 of the Code of Alabama, 1975, as amended, consisting of maps, charts, and textual material, that constitutes a policy guide to decisions about the future development of the City.
- 2.1.34. *Conditional Use.* A use which may be permitted only by the Council following a recommendation by the Commission in accordance with [§13.3](#). The recommendation by the Commission may be to approve or deny the application, which said recommendation is advisory only. Zoning is a legislative matter decided by the Council. The Council is not bound by the recommendation of the Commission.
- 2.1.35. *Condominium.* A division of property or interest in property as defined by, created under and subject to the "Alabama Uniform Condominium Act of 1991" and subsequent amendments and revisions.
- 2.1.36. *Conservation Easement.* A voluntary agreement between a landowner and a municipal agency or qualified not-for-profit corporation to restrict the development, management, or use of the land in perpetuity or as otherwise defined by the terms of the easement.
- 2.1.37. *Covenant.* A restriction upon the use of a property placed in a deed running with the land and enforced by private landowners or homeowner or condominium associations.
- 2.1.38. *Dedication.* The deliberate assignment of land by its owners for any general or public uses, reserving to themselves no other rights than such as are compatible with the full exercise and enjoyment of the public uses to which the property has been devoted.
- 2.1.39. *Deed.* A legal document conveying ownership of real property.
- 2.1.40. *Density.* The number of dwelling units per acre of lot area.
- 2.1.41. *Design Capacity.* The maximum number of persons that may be accommodated by a use as determined by its design and by the Building Code.
- 2.1.42. *Developer.* Any owner, agent of such owner or tenant with the written permission of such owner, who makes or causes to be made a land development.
- 2.1.43. *Development.* Any of the following activities:
1. The improvement of one (1) lot or more abutting lots, tracts or parcels of land for any purpose involving:
 - a. a group of two (2) or more residential or non-residential buildings, whether proposed initially or cumulatively, or a single non-residential building on a lot or lots regardless of the number of occupants or tenure; or
 - b. the division or allocation of land or space, whether initially or cumulatively, between or among two

- or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups, or other features;
 - 2. A subdivision of land.
 - 3. Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations.
- 2.1.44. *Driveway*. A private drive providing access between a street or access drive and a parking or other vehicular use area.
- 2.1.45. *Dwelling Unit*. One or more rooms located within a building and forming a single habitable unit with facilities, which are used or intended to be used for living, sleeping, cooking and eating purposes by not more than one (1) family.
- 2.1.46. *Easement*. A right granted by a landowner to a grantee, allowing for limited use of private land for a public or quasi-public or private purpose, and with which the property owner shall not have the right to make use of the land in a manner that violates the right of the grantee.
- 2.1.47. *Engineer*. A professional engineer registered by the State of Alabama Board of Registration for Professional Engineers and Surveyors.
- 2.1.48. *Entity*. A person, association, firm, corporation, or organization of any kind.
- 2.1.49. *Erect*. To build, construct, reconstruct, move upon or any other physical operation on the premises required for development.
- 2.1.50. *Façade*. The exterior wall of a building extending the entire width of a building elevation that faces a public street or any public way.



- 2.1.51. *Family*. One or more persons related by blood, marriage, or adoption, or by some other legal custodial relationship, living and cooking together as a single housekeeping unit in a single dwelling unit; or two unrelated individuals living and cooking together as a single housekeeping unit in a single dwelling unit. For purposes of this Ordinance, “family” shall not include any society, club, fraternity, sorority, association, lodge, federation, or like organizations; or any group of individuals who are in a group living arrangement. See also “Housekeeping Unit”.
- 2.1.52. *Fence*. Any barrier of any material or combination of materials, other than a building, erected to enclose or screen areas of land or used as a means of protection, confinement or buffering. For the purposes of this Ordinance, the “fence” includes the term “wall”, but does not include the term “retaining wall”.
1. *Buffer Fence*. A fence used toward fulfillment of the requirements of [§9.3 Buffers](#).
 2. *Privacy Fence*. A fence intended to provide a physical and visual barrier between common or public areas and a private area or use. Privacy fences are distinguished from other fences by their height and opaque design.

3. *Screen Fence*. A fence used toward fulfillment of the requirements of [§9.4 Screening](#).

2.1.53. *Floodplain*. An area adjacent to a watercourse, which area is subject to flooding as the result of the occurrence of an intermediate regional flood and which area thus is so adverse to past, current or foreseeable construction or land use as to constitute a significant hazard to public health and safety and to property. Floodplains are identified by the National Flood Insurance Program.

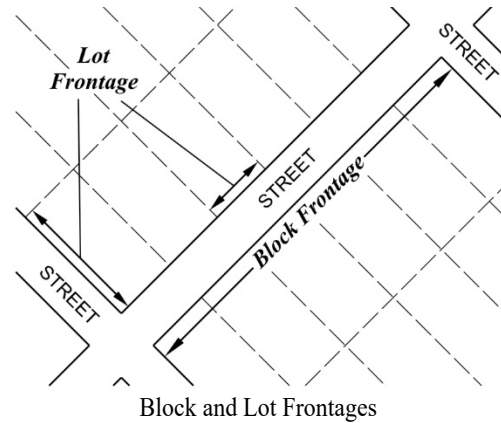
2.1.54. *Floodway*. The area regulated by Federal, state, or local requirements to provide for the discharge of the base flood so the cumulative increase in water surface elevation is no more than a designated amount (not to exceed one foot as set by the National Flood Insurance Program) within the 100-year floodplain.

2.1.55. *Floor Area, Gross*. The gross horizontal areas of all floors, measured from the exterior faces of the exterior walls of a building. Unfinished garages, basements and cellars are not included in the calculation of gross floor area.

2.1.56. *Fowl*. Winged animals other than household pets, including but not limited to, chickens, geese, and ducks, that are kept, bred or raised for commercial purposes.

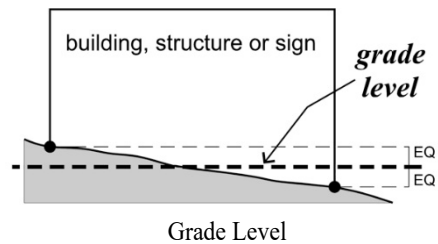
2.1.57. *Frontage*.

1. *Frontage, Block*. All the property on one side of a street between two intersecting streets measured along the right-of-way line of the street, or if the street is dead-ended, then all of the property on one (1) side between an intersecting street and the dead end of the street.



2. *Frontage, Lot*. The width of a lot as measured along its front lot line.

2.1.58. *Grade Level*. The average level of the finished ground surface adjacent to the exterior walls of the building.



2.1.59. *Grading Plan*. A map of a proposed development defining existing and proposed elevations, watercourses, vegetative cover and drainage patterns, including one (1) foot contours, spot elevations, and flow arrows. The plan also describes the limits and depths of excavations, fills and removal of native vegetation.

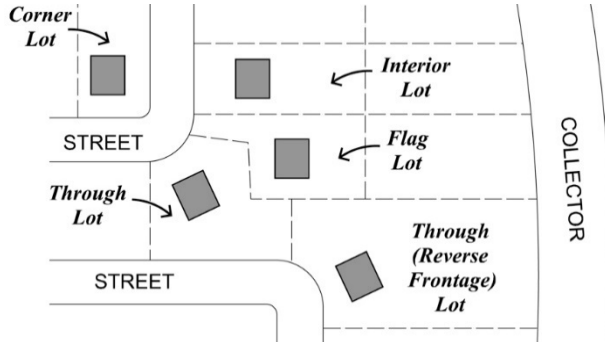
2.1.60. *Greenway*. An open space corridor that links urban, suburban, and rural communities to natural and scenic areas with a network of connected trails, walkways, and natural preservation areas.

2.1.61. *Gross Floor Area*. The floor area within the inside perimeter of the exterior walls of the building under consideration, exclusive of vent shafts and courts, without deduction for corridors,

- stairways, ramps, closets, the thickness of interior walls, columns or other features.
- 2.1.62. *Gross Leasable Area*. The total floor area for which the tenant pays rent and that is designed for the tenant’s occupancy and exclusive use, including any basements and mezzanines.
- 2.1.63. *Half Story*. See “Story, Half Story”.
- 2.1.64. *Housekeeping Unit* or *Single Housekeeping Unit*. A family living together in a single dwelling unit, with common access to and common use of all living and eating areas and facilities for the preparation and serving of food within the dwelling unit.
- 2.1.65. *Impervious Surface*. A man-made surface that does not allow the passage or infiltration of rain water. This may include improvements such as roadways, sidewalks, driveways, parking lots and patios. Improvements constructed of pervious materials and intended to minimize stormwater runoff can be submitted to the City’s Engineer’s office for approval.
- 2.1.66. *Improvements*. Those physical additions and changes to the land that may be necessary to produce usable and desirable developments including but not limited to driveways, landscaping, streets, sidewalks, curbs and gutters, sewer, and stormwater control facilities.
- 2.1.67. *Interim Use*. Any temporary use of land in any area of a planned development, which has been approved as a part of the Master Development Plan and criteria. An interim use can be any use and may or may not be a permitted use or a conditional use in the applicable district.
- 2.1.68. *Intersection Sight Distance*. The length of the line of sight between a motorist, stopped at an intersection, and the nearest intersection, driveway, alley or other signalized or non-signalized access point to the left or to the right of the motorist.
- 2.1.69. *Junk*. Materials including scrap, copper, brass, rope, rags, batteries, paper, trash, rubber debris, waste iron, steel and other old or scrap ferrous or non-ferrous material, including wrecked, scrapped, ruined, dismantled or junked motor vehicles or parts thereof.
- 2.1.70. *Landscape Architect*. A landscape architect registered by the State of Alabama.
- 2.1.71. *Landscaping*. Treatment of grade with ground cover, shrubs, trees and other vegetation, and/or ornamentation
1. *Building Landscaping*. A landscaped strip between a building and its lot boundary or off-street parking area, as required by [§9.2 Site Landscaping](#).
 2. *Frontage Landscaping*. A landscaped strip between off-street parking areas or buildings and adjacent public streets as required by [§9.2 Site Landscaping](#).
 3. *Interior Landscaping*. Landscaping within an off-street parking area as required by [§9.2 Site Landscaping](#).
 4. *Perimeter Landscaping*. A landscaped strip between an off-street parking area and abutting lots. Perimeter landscaping does not include landscaping between an off-street parking area and buildings on the same lot.
- 2.1.72. *Livestock*. Animals of any kind, including fish and fowl, kept, bred or raised for commercial or other purposes, excluding house pets such as domestic cats and dogs, fish, fowl, and other similar animals kept for personal pleasure in accordance with regulations of the Health Department and applicable animal control authority of the applicable County.

2.1.73. *Lot*. A designated Parcel, tract or area of land established by plat, subdivision, or as otherwise permitted by law, to be separately owned, used, developed, or built upon.

1. *Corner Lot*. A lot abutting upon two or more streets at their intersection or on two parts of the same street forming an interior angle of less than 135 degrees.
2. *Flag Lot*. A lot that does not meet the lot width requirements of its district within the normally required front yard setback.
3. *Interior Lot*. Any lot which is not a corner lot.
4. *Reverse Frontage Lot*. A through lot with vehicular access restricted to the street of lesser classification.
5. *Through Lot*. A lot that fronts on two parallel streets or that fronts on two streets that do not intersect at the boundaries of the lot.



Lot Types

2.1.74. *Lot Area*. The area contained within the lot lines of a lot, excluding any street right-of-way, but including the area of any easement.

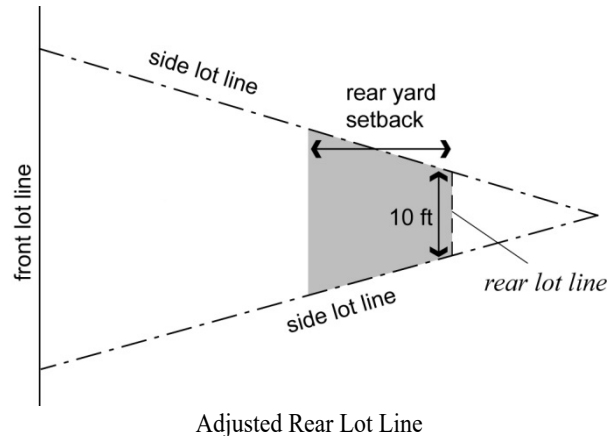
2.1.75. *Lot Depth*. The average distance between the front and rear lot lines.

2.1.76. *Lot Lines*.

1. *Front Lot Line*. A lot line separating a lot from the street on which it fronts. On corner lots and double-frontage lots, all

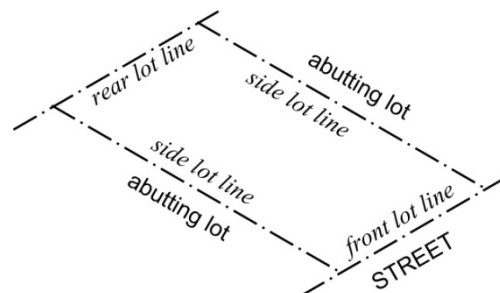
lot lines abutting a street (except alleys 16' or less in width), shall be front lot lines.

2. *Rear Lot Line*. A lot line, which is most distant from a front lot line. In the case of corner lots, the rear lot line shall be that lot line, other than a front lot line, that is shorter in dimension. For the purposes of determining rear yard setbacks on a lot where the side lot lines meet in a point, the "rear lot line" is assumed to be a line not less than ten (10) ft long drawn within the lot between the two side lot lines and parallel to the front lot line, and which is referred to as the "Adjusted Rear Lot Line".

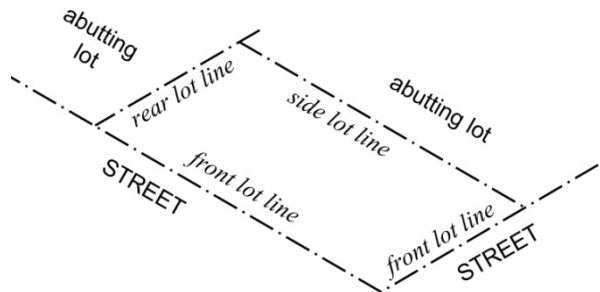


Adjusted Rear Lot Line

3. *Side Lot Line*. Any lot line, which is not a front or rear lot line.

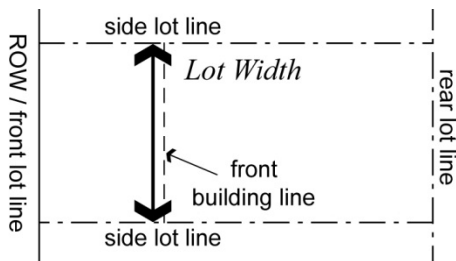


Lot Lines, Interior Lot

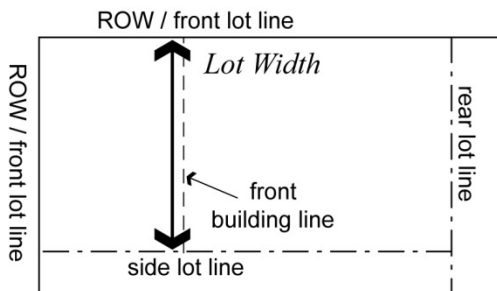


Lot Lines, Corner Lot

2.1.77. *Lot Width*. In the case of interior lots, the distance between the side lot lines. In the case of corner lots, the distance between the front lot line and the opposing lot line. Such distance shall be measured along a straight line, which is at right angles to the axis of the lot, and shall be measured at the front yard setback line. When a lot abuts on a curved street, the lot width is determined using the arc length.



Lot Width, Interior Lot



Lot Width, Corner Lot

2.1.78. *Lot of Record*. A lot that exists as shown on a deed or plat, which has been recorded by the applicable County.

2.1.79. *Master Development Plan*. A plan required for the review and approval of a planned development, in which necessary information is provided sufficient for the Commission, Council and other

reviewers to determine its compliance with the intents and requirements of the applicable provisions of this Ordinance.

2.1.80. *Mulch*. A material (pine straw, bark chips, wood chips, etc.) placed on the ground to stabilize soil, protect roots, limit weed growth and otherwise promote tree and shrub growth.

2.1.81. *Net Floor Area*. The actual occupied area, not including unoccupied accessory areas such as corridors, stairways, ramps, toilet rooms, storage areas, mechanical rooms and closets.

2.1.82. *Nonconformities*. An improvement, premises or use that does not conform to regulations of this Ordinance and/or other regulations of the City, but which lawfully existed prior to the effective date of such regulations.

1. *Nonconforming Improvements*. Any improvements made to land not in conformance with the provisions of this Ordinance or other applicable regulations of the City. Improvements, which may be classified as nonconforming, include but are not limited: parking areas, driveways, lighting, sidewalks, buffers and screening, and other landscaping.

2. *Nonconforming Premises*. A premises and/or building thereupon not meeting the applicable dimensional requirements of this Ordinance.

3. *Nonconforming Use*. The use of any building or land which was lawful at the time of passage of this Ordinance or amendment thereto, but which use does not conform, after the passage of this Ordinance or amendment thereto, with the use regulations of the district in which it is situated.

2.1.83. *Open Space*. Land, not covered by parking areas, rights-of-way or buildings other than recreational structures, pools

and stormwater facilities, which is landscaped or left in a natural state as required by the provisions of this Ordinance.

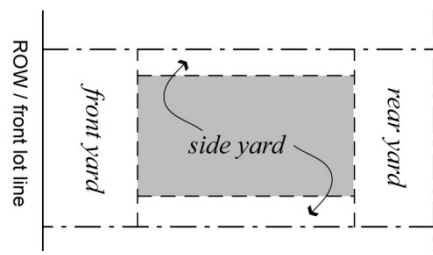
1. *Common Open Space*. Open space within a development held in common ownership and maintained by a property owners' association of all residents for recreation, protection of natural land features, amenities or buffers; is freely accessible to all residents of the development; and is protected by the provisions of this Ordinance to ensure that it remains in such use(s).
- 2.1.84. *Patio*. A level, landscaped, and/or surfaced area directly adjacent to a principal building near finished grade and not covered by a permanent roof.
- 2.1.85. *Planned Development*. One or more contiguous parcels planned and developed as a single entity according to an approved Master Development Plan.
- 2.1.86. *Planning Commission or Commission*. The City of Vestavia Hills Planning and Zoning Commission.
- 2.1.87. *Poultry*. Fowl normally raised as food such as chickens, ducks, geese, guineas and turkeys or for commercial uses such as peacocks.
- 2.1.88. *Premises*. A lot, parcel, tract or plot of land including all buildings, improvements and structures existing thereon.
- 2.1.89. *Principal Building*. A building, in which is conducted the principal use of the lot on which it is situated.
- 2.1.90. *Principal Use*. The primary or predominant use of any lot or parcel.
- 2.1.91. *Property Maintenance Code or City Property Maintenance Code*. The International Property Maintenance Code as adopted by the City Council, as amended.
- 2.1.92. *Public Hearing*. A meeting announced and advertised in advance and open to the public, with the public given an opportunity to talk and participate. Public hearings are advertised and held in accordance with the Code of Alabama, 1975, as amended.
- 2.1.93. *Public Notice*. Notice published prior to a Public Hearing, as required by the Code of Alabama, 1975, as amended. Such notice states the time and place of the hearing and the particular nature of the matter to be considered at the hearing. Public notice for rezoning, conditional use and/or variance requests also include the posting of a sign at conspicuous locations along the perimeter of the subject property; the sign is posted at least one (1) week prior to the hearing and describes the nature, date, time, and location of the hearing.

Public notice of a public hearing to consider an application for zoning or rezoning must be provided (published or posted) by the City in accordance with the Code of Alabama, 1975, as amended, including specifically, Title 11-52-77 and Title 11-45-8 and Act 1123 of the 1973 Legislature.
- 2.1.94. *Remote Parking*. A parking area not located on the same lot as the use for which the parking is provided.
- 2.1.95. *Retaining Wall*. A wall resisting the lateral displacement of soil or other materials to improve or control drainage and erosion.
- 2.1.96. *Ridge Line*. The intersection of two roof surfaces forming the highest horizontal line of the roof.
- 2.1.97. *Right-of-Way*. Land reserved, used, or to be used for a street, alley, walkway, drainage facility, or other public purpose.

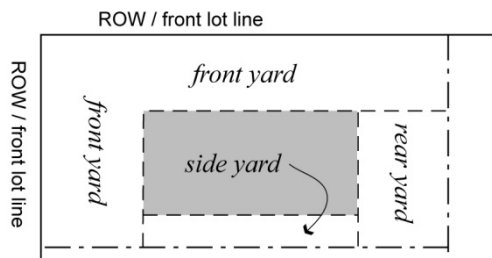
- 2.1.98. *Right-of-Way Line*. The line that forms the boundary of a right-of-way, typically corresponding with the front lot line of abutting properties.
- 2.1.99. *Runoff*. The portion of rainfall, irrigation water and any other liquids that flows across ground surface and eventually is returned to streams.
- 2.1.100. *Setback*. The distance between a building or structure and a lot line. See also “Yard”.
- 2.1.101. *Setback Line*. A line that is the required minimum distance from any lot line and that establishes the area within which the principal structure must be erected or placed.
- 2.1.102. *Shrub*. A woody plant, generally multi-stemmed and smaller than a tree.
- 2.1.103. *Sight Triangle, Clear*. An area of unobstructed vision at a street intersection defined by a line of sight between points at a given distance from the intersection of the street centerlines. See also “Intersection Sight Distance”.
- 2.1.104. *Site*. Area of a lot occupied by a structure.
- 2.1.105. *Stacking Space*. A space intended for the queuing of vehicles to a drive-through window, fuel pump, ATM or similar standing point.
- 2.1.106. *Story*. That portion of a building included between the surface of any floor and the surface of the floor next above it, or, if there be no floor above it, then the space between the floor and the ceiling next above it.
1. *Half Story*. A space under a sloping roof in which space the possible floor area with headroom of five (5) feet or less contains at least forty (40) percent of the total floor area of the story directly beneath it; or a building story that contains not more than fifty (50) percent of the total floor area of the story directly beneath it.
- 2.1.107. *Street*. Any vehicular way that is (1) an existing state, county, or municipal roadway; (2) shown upon a plat approved pursuant to law; (3) approved by other official action; (4) shown on a plat duly filed and recorded in the office of the applicable county tax assessor; (5) shown on the official map or adopted master plan. The term “street” includes the land between the street lines, but excludes alleyways that are 20’ or less in width, whether improved or not.
1. *Access Drive*. A private street providing access to a development from a street on which the development has only a very narrow street frontage.
 2. *Access Street*. A minor street, which is parallel and in close proximity to a higher order street and that provides access to abutting properties. Also commonly referred to as a frontage road or service road.
 3. *Arterial*. A street that distributes traffic to and from collectors. Arterials include U.S. Highway 31, U.S. Highway 280, and Columbiana Road.
 4. *Collector*. A street that collects traffic from local streets and connects with minor and major arterials. Collector streets include, but are not limited to, Acton Road, Altadena Road, Cahaba Heights Road, Cahaba River Road, Crosshaven Drive, Dolly Ridge Road, Green Valley Road, Massey Road, Rocky Ridge Road, Shades Crest Road, and Tyler Road.
 5. *Cul-de-sac*. A local street terminating in a vehicular turnaround at one end.
 6. *Local Street*. A street used primarily to provide access to abutting properties.

- 2.1.108. *Street Centerline*. A line running parallel with the street right-of-way which is half the distance between the extreme edges of the official right-of-way width as surveyed, or where not surveyed, half the distance from the edges of pavement.
- 2.1.109. *Structure*. Anything constructed or erected, the use of which requires a location on the ground, or attached to something having a location on the ground, including but not limited to buildings, signs, billboards, backstops for tennis courts, fences, or radio tower.
- 2.1.110. *Structural Alterations*. Any change in the supporting members of a building or structure, such as bearing walls, columns, beams or girders.
- 2.1.111. *Temporary Building*. Portable, mobile or transportable contractor’s construction buildings, the use of which is incidental to construction operations being conducted on the same or adjoining lot or tract will be allowed with permit all districts, provided they are not used as a dwelling.
- 2.1.112. *Tree*.
1. *Canopy Tree*. A deciduous tree, usually single-trunked, with a defined crown of foliage, which attains a mature height of at least thirty (30) feet.
 2. *Understory Tree*. A deciduous or evergreen tree which attains a mature height of no greater than thirty (30) feet.
- 2.1.113. *Use*. The purpose for which land or a building or other structure is designed, arranged, or intended or for which it is or may be occupied or maintained.
- 2.1.114. *Variance*. Relief or an adjustment to the literal requirements of this Ordinance granted pursuant to the provisions of [Article 12](#).

- 2.1.115. *Waiver*. Limited relief or adjustment to the literal requirements of this Ordinance granted by the Zoning Official.
- 2.1.116. *Wall*. (1) A vertical screen or barrier distinguished from a “fence” in its design and materials. See “Fence”. (2) A vertical exterior or interior surface of a building.
- 2.1.117. *Yard*. An open space lying between the principal building and the nearest lot line.
1. *Front Yard*. A yard extending the full width of the lot between any building and the front lot line and measured from perpendicular to the front building line.
 2. *Rear Yard*. A yard extending across the full width of the lot between the principal building and the rear lot line (or adjusted rear lot line) and measured perpendicular to the rear building line.
 3. *Required Yard*. The minimum required open space between a building or structure and the nearest lot line, unoccupied and unobstructed by any structure from the ground upward.
 4. *Side Yard*. A yard between the main building and the side lot line and extending from the front yard to the rear yard and measured perpendicular to the side building line.



Yards, Interior Lot



Yards, Corner Lot

2.1.118. *Zoning Approval*. Certification issued by the Zoning Official stating that an application for development is in conformity with the requirements of this Ordinance.

2.1.119. *Zoning Official*. The municipal official designated to administer this Zoning Ordinance. The term “Zoning Official” may also include a designated representative of the Zoning Official.

§2.2. Use Definitions

2.2.1. *Animal Shelter*. Non-profit (e.g., SPCA) or public organization providing shelter for small domestic animals.

2.2.2. *Assisted Living Facility*. A permanent building, portion of a building, or a group of buildings in which room, board, meals, laundry, and assistance with personal care and other services are provided for not less than twenty-four (24) hours in any week to a minimum of two ambulatory adults not related by blood or marriage to the owner and/or administrator and licensed by the State of Alabama.

2.2.3. *Automotive Repair Service*.

1. *Minor Automotive Repair Service*. A place of business engaged in the repair and maintenance of automobiles and light trucks including the sale, installation, and servicing of mechanical equipment and parts but not including painting, body work, upholstery work, fabrication of parts, or rebuilding of engines.

2. *Major Automotive Repair Service*. A place of business engaged in the repair and maintenance of automobiles and light trucks including the sale, installation, and servicing of mechanical equipment and parts including painting,

body work, upholstery work, fabrication of parts, or rebuilding of engines.

2.2.4. *Bed and Breakfast*. An establishment having guest rooms, which are subordinate and incidental to the main, owner occupied, single-family residential use.

2.2.5. *Boarding House*. Any building or portion thereof that contains not less than three (3) nor more than nine (9) guest rooms, which are designed or intended to be used, let, or hired out for occupancy by individuals for compensation whether paid directly or indirectly, for a definite period of time longer than thirty (30) days.

2.2.6. *Business Support Service*. A place of business that supplies support services primarily to business or professional offices or services, such as photocopy, computer, and office equipment, supplies and services.

2.2.7. *Caretaker Dwelling*. A residence, incidental to a principal use, for an on-site manager, watchman or caretaker employed on the premises.

2.2.8. *Clinic*. A building or portion of a building where patients are not lodged overnight, but are admitted for examination and treatment.

2.2.9. *Club, Private*. A building or portion thereof or premises owned or operated by a corporation, association, person for a social, educational or recreational purpose, but not primarily for profit or to render a service which is customarily carried on as a business.

2.2.10. *Conservation Subdivision*. A residential development, in accordance with [§7.3](#), wherein a portion(s) of the site is set aside as open space.

2.2.11. *Construction Service*. A place of business engaged in construction

activities, incidental storage, and wholesaling of building material (but not a home improvement center which also sells at retail), such as a building contractor, trade contractor, or wholesale building supplies store.

2.2.12. *Convenience Store.* A retail sales business, which specializes in providing household products and foods. Convenience stores may also provide for any or all of the following as an accessory use: video tape rental, preparation and sale of deli foods.

2.2.13. *Country Club.* A recreational facility, usually restricted to members and their guests, which generally includes a clubhouse, dining and recreation facilities.

2.2.14. *Day Care Center.* A care facility, licensed by the State of Alabama Department of Human Resources, which receives more than six (6) children for care during only part of the day.

2.2.15. *Day Care Home, Family.* A care facility, licensed by the State of Alabama Department of Human Resources, which is a single-family dwelling and which receives children for care during only part of the day.

2.2.16. *Donation Bin.* A container or receptacle held out to the public as a place for people to drop off clothing or other items as donations to a charitable organization.

2.2.17. *Duplex.* A building designed and arranged to provide separate sleeping, cooking and kitchen accommodations and toilet facilities for occupancy by two families.

2.2.18. *Dwelling.* A building containing one or more dwelling units used for residential purposes, but in the case of a building having two or more portions divided by one or more party walls forming a

complete separation, each such portion shall be considered a separate dwelling.

1. *Single-family Dwelling.* A building designed for or occupied exclusively by one family and having only one dwelling unit from the ground to roof and having independent outside access.

2. *Dwelling, Multi-Family.* A building or portion thereof designed for occupancy by four or more families living independently of each other under one roof.

2.2.19. *Entertainment.*

1. *Indoor Entertainment.* A commercial establishment providing spectator entertainment within an enclosed building, including movie theaters and playhouses; and art centers and similar indoor cultural facilities.

2. *Outdoor Entertainment.* A commercial establishment providing spectator entertainment in open or partially enclosed or screened facilities, including amphitheaters, sports arenas, racing facilities, and amusement parks.

2.2.20. *Farm.*

1. *Raising of Crops.* The tilling of soil, the raising of crops, horticulture and gardening and including the sale of crops or horticultural products incidental to the operation of a farm.

2. *Raising of Livestock.* The keeping or raising of cattle, horses, swine, and/or fowl and including sale of such livestock and dairy products incidental to the operation of a farm.

2.2.21. *Farming, Forestry.* Operations involving the operation of timber tracts, tree farms, forest nurseries, the gathering of forest products, or performing forest services, including temporary sawmills and chippers for cutting of timber growth on

the same premises but excluding lumber yards, mills, and similar activities.

- 2.2.22. *Farm Support Business.* A commercial establishment engaged in the sale of farm support goods and services, including the following activities: the sale of feed, grains, fertilizers, pesticides, and similar farm support goods, the provision of warehousing and storage facilities for raw farm products, and the provision of veterinary services to large animals.
- 2.2.23. *Gas Station.* A business that includes gasoline sales and that may also include an automatic car wash function and retail sales of food, beverages, and sundries, but which does not include any automotive repair services, sales, or rental. A “Gas Station” that contains a minor automotive repair function is considered a “Service Station”.
- 2.2.24. *Group Home.* A non-profit or for-profit facility for the sheltered care of persons with special needs, which, in addition to providing food and shelter, may also provide some combination of personal care, social or counseling services and transportation.
- 2.2.25. *Home Improvement Center.* A place of business providing building, appliance, yard and garden materials, tools, and supplies at retail and wholesale.
- 2.2.26. *Home Occupation.* An occupation or activity carried out for gain which is clearly incidental to use of the premises for dwelling purposes in accordance with [§7.1 Home Occupations](#).
- 2.2.27. *Hotel.* A building offering transient lodging accommodations to the general public and which may include other functions, such as restaurants, conference rooms, entertainment, personal services, and recreational facilities. “Hotels” are distinguished from “motels” in that hotel

guest rooms are accessible from the interior of the building.

- 2.2.28. *Institution.* A nonprofit, religious, or public use, such as a religious building, library, public or private school, hospital, or government-owned or government-operated building, structure, or land used for public purpose. For the purposes of this Ordinance, institutional uses are further categorized as:
 - 1. *Low Intensity Institutional Use.* Civic, service, and fraternal organizations and cultural facilities up to 10,000 sq. ft.; day care centers; pre-schools; elementary schools; group homes with more than six (6) residents.
 - 2. *Medium Intensity Institutional Use.* Nursing homes; civic, service, and fraternal organizations and cultural facilities between 10,000 and 50,000 sq. ft., government buildings up to 12,500 sq. ft.; health institutions up to 50,000 sq. ft.; junior high and middle schools; places of assembly up to 750 seats; stadiums and arenas up to 5,000 seats; other institutions up to 50,000 sq. ft.
 - 3. *High Intensity Institutional Use.* Government buildings greater than 12,500 sq. ft.; health institutions greater than 50,000 sq. ft.; places of assembly greater than 750 seats; high schools, universities, colleges, junior colleges; other institutions greater than 50,000 sq. ft.
- 2.2.29. *Kenel.* A lot or premises on which three (3) or more dogs are housed, groomed, bred boarded, trained, or sold, all for a fee or compensation.
- 2.2.30. *Laundromat.* An establishment providing washing, drying, or dry cleaning machines on the premises for rental use to the general public.

- 2.2.31. *Laundry and Dry Cleaning Establishment.* A service establishment engaged in the cleaning or laundering of garments primarily for individuals.
- 2.2.32. *Laundry, Industrial.* A service establishment primarily engaged in high volume laundry and garment services, including linen supply; diaper service; industrial laundries; and carpet and upholstery cleaners.
- 2.2.33. *Live-Work.* A two-story or taller building designed to accommodate a business on the ground story and one single-family dwelling on the upper story. The business is owned and/or operated by the owner of the dwelling and therefore the building may be designed to accommodate interior access between the business space and the dwelling above.
- 2.2.34. *Lodging.* A use in which temporary living quarters are made available to the general public for compensation, including but not limited to hotels and motels.
- 2.2.35. *Lounge.* A licensed establishment engaged in the preparation, sale, or serving of liquor for consumption on the premises, including taverns, bars, cocktail lounges, night clubs, private clubs, restaurant lounges, hotel or motel lounges, and similar uses where liquor consumption is a primary or incidental activity on the premises for the establishment. Not included within this definition are establishments that sell or serve only beer or wine as an incidental activity on the premises or establishments that sell liquor, beer, or wine in packages for off-premise consumption.
- 2.2.36. *Maintenance Service.* An establishment providing building and yard maintenance services, such as janitorial services, exterminating services, landscape services, and window cleaning services to include incidental covered storage only.
- 2.2.37. *Manufacturing, Light.* The manufacture, predominantly from previously prepared materials, of finished products or parts, including processing, fabrication, assembly, treatment, and packaging of such products, and incidental storage, sales, and distribution of such products.
- 2.2.38. *Mixed Use.* The co-location of residential uses with non-residential uses on one lot or in one building, as may be permitted within certain districts within this Ordinance.
- 2.2.39. *Motel.* A building offering transient lodging accommodations to the general public and which may include other functions, such as restaurants, conference rooms, entertainment, personal services, and recreational facilities. “Motels” are distinguished from “hotels” in that motel guest rooms are accessible from the exterior of the building.
- 2.2.40. *Neighborhood Retail.* Retail uses that serve the daily and weekly needs of residents in surrounding neighborhoods and that are housed in buildings of a scale compatible with surrounding residential development. Such uses include but are not limited to delicatessens, small grocery stores, drug stores, convenience stores, hardware stores, clothing stores and jewelry stores. Neighborhood retail does not include appliance, furniture, gasoline or automotive sales.
- 2.2.41. *Neighborhood Services.* Service uses that serve the daily and weekly needs of residents in surrounding neighborhoods and that are housed in buildings of a scale compatible with surrounding residential development. Such uses include, but are not limited to, banks, dry

- cleaning pick-up stations, beauty salons, barber shops, shoe repair, alterations, and fitness centers. Neighborhood services do not include automotive repair services.
- 2.2.42. *Nursery School or Kindergarten.* Any premises or portions thereof used for educational work or parental care of children of less than the age required for enrollment in the public school system. Nursery school or kindergarten includes every preschool, nursery school or kindergarten operated separate and apart from another school offering general education courses or from a place of worship. For purposes of this Ordinance, nursery schools or kindergartens operated in conjunction with and on the premises of any such school or place of worship shall be considered a part of such school or place of worship.
- 2.2.43. *Nursing Home.* A home for the aged or infirm in which three or more persons not of the immediate family are received, kept or provided with food or shelter or care for compensation, but not including hospitals, clinics or similar establishments devoted primarily to the diagnosis and treatment of the sick or infirm.
- 2.2.44. *Personal Service.* A retail establishment providing services involving the care of a person, such as a barber shop, beauty shop, cosmetic studio, dry cleaning and laundry pick-up station, indoor exercise and fitness center, tanning salon, seamstress, tailor, shoe repair shop, key repair shop, travel agency, interior decorator, formal wear rental, and similar uses.
- 2.2.45. *Place of Assembly.* Buildings arranged for general assembly for civic, public, social or religious purposes, including banquet rooms, coliseums, community centers, civic centers, places of worship and similar uses.
- 2.2.46. *Place of Worship.* Building used for non-profit purposes by a recognized and legally established sect solely for purposes of worship.
- 2.2.47. *Public Facility.* Buildings arranged for the purpose of providing public services, not otherwise listed in this section, including government offices, post offices, transit stations, police stations, fire and emergency service stations, civil defense operations, and similar uses.
- 2.2.48. *Public Utility Facility.* Facility that provides public utility services to the public at large, including water and sewerage facilities, gas distribution facilities, electric transmission and distribution facilities, and cable transmission and distribution facilities.
- 2.2.49. *Recreation.*
1. *Active Recreation.* Outdoor recreation that requires dedicated facilities and maintenance, such as swimming, organized sports, tennis and similar activities.
 2. *Indoor Recreation.* A commercial establishment providing recreational or sports activities to participants within an enclosed building, including bowling alleys, billiard parlors, video game centers, ice and roller skating rinks, and other commercial indoor recreational and sports activities.
 3. *Outdoor Recreation.* A commercial establishment providing recreation or sports activities to participants in open or partially enclosed or screened facilities, including driving ranges, miniature golf courses, golf courses, swimming pools, tennis courts, and other commercial outdoor recreational and sports activities.
 4. *Passive Recreation.* Outdoor recreation that does not require significant maintenance or facilities, such as

walking, hiking, picnicking, viewing, and environmental education activities. Passive recreation shall also include the impromptu use of an open space for non-organized sports activities or games.

2.2.50. *Restaurant.*

1. *Fast Food Restaurant.* An establishment where food and drink are rapidly prepared for carry out, fast delivery, drive-through, or drive-in and may also include standard sit-down consumption.
2. *Standard Restaurant.* An establishment where food and drink are prepared, served, and primarily consumed within the building where guests are seated and served.

2.2.51. *Salvage Yard.* A lot or structure or part thereof, used primarily for the collecting, storage and sale of junk or for the collecting, dismantling, storage and salvaging of machinery or vehicles not in running condition, or for the sale of parts thereof.

2.2.52. *Service Station.* Any building, structure, or land used primarily for the dispensing, sale or offering for sale at retail of any automobile fuels, oils or accessories but not including major work such as motor overhaul, body and fender repair or spray painting.

2.2.53. *Shopping Center.* A group of commercial establishments planned, constructed and managed as a single entity with common parking and driveway facilities.

2.2.54. *Telecommunication Facilities.* Any cables, wires, lines, wave guides, antennas, structures, and any other facilities or equipment associated with the transmission or reception of electronic communication located near or installed upon a tower or antenna support structure.

2.2.55. *Townhouse.* A single-family dwelling in a row of at least three such units in which each unit has its own front and rear outdoor access, no unit is located over another, and each unit is separated by one or more vertical common fire-resistant walls.

2.2.56. *Triplex.* A building containing three (3) dwelling units, each of which has direct access to the outside or to a common hall.

§2.3. Abbreviations used in this Ordinance

- 2.3.1. ac – Acre(s)
- 2.3.2. ADEM – Alabama Department of Environmental Management
- 2.3.3. ALDOT – Alabama Department of Transportation
- 2.3.4. ATM – Automated Teller Machine
- 2.3.5. bldg – Building
- 2.3.6. BR – Bedroom or guest accommodation
- 2.3.7. BZA – Board of Zoning Adjustment
- 2.3.8. DRB – Design Review Board
- 2.3.9. DU – Dwelling unit
- 2.3.10. ft – Foot or Feet
- 2.3.11. GFA – Gross Floor Area
- 2.3.12. lf – Linear feet
- 2.3.13. max. – Maximum
- 2.3.14. min. – Minimum
- 2.3.15. MPO – Metropolitan Planning Organization
- 2.3.16. n/a – not applicable
- 2.3.17. PUD – Planned Unit Development
- 2.3.18. ROW – Right-of-way
- 2.3.19. sq. ft. – Square feet
- 2.3.20. % - Percent

2.3.21. § - Section, Subsection or similar
division of this Ordinance

Article 3 ESTABLISHMENT OF DISTRICTS

§3.1. Purpose

The following Ordinance has been prepared by the Vestavia Hills City Planning and Zoning Commission, hereinafter referred to as “the Commission” and adopted by the Vestavia Hills City Council, hereinafter referred to as “the Council”. This Zoning Ordinance regulates the general use of private land. It does this through the establishment of zones or districts and outlines the intended use for each. Thus there are residential districts and institutional, business and planned development districts.

The Ordinance further sets forth conditions for use. For instance, in order to control the density of population it prescribes minimum front, rear and side yards, numbers of families per lot, and amount of total ground space per family on any one lot.

This Zoning Ordinance is administered by the Zoning Official.

This Ordinance provides for a Board of Zoning Adjustment. The Board’s duties are largely judicial. If the Building Official refuses to issue a Building Permit, applicant can appeal to the Board of Zoning Adjustment for a review of his decision.

§3.2. Zoning Districts

For the purposes of this Ordinance the City is hereby divided into the following districts:

- 3.2.1. E-2 Residential Estate District
- 3.2.2. R-1 Low Density Residential District
- 3.2.3. R-2 Medium Density Residential District
- 3.2.4. R-3 Medium Density Residential District
- 3.2.5. R-4 Medium Density Residential District
- 3.2.6. R-5 Multi-family Residential District
- 3.2.7. R-6 Zero Lot Line Residential District
- 3.2.8. R-7 Duplex and Triplex Residential District
- 3.2.9. R-8 Townhouse Residential District)
- 3.2.10. R-9 Planned Residential Community District
- 3.2.11. RC-1 Residential District (Condominiums)
- 3.2.12. A Agricultural District
- 3.2.13. B-1 Neighborhood Business District
- 3.2.14. B-1.2 Neighborhood Mixed Use District
- 3.2.15. B-2 General Business District
- 3.2.16. B-3 Arterial Business District
- 3.2.17. O-1 Office Park District
- 3.2.18. O-2 Office Park District
- 3.2.19. INST Institutional District
- 3.2.20. PUD Planned Unit Development District
- 3.2.21. MXD Planned Community Mixed Use District

§3.3. Interpretation of District Boundaries

Where uncertainty exists as to the boundaries of any district shown on the zoning map, the following rules shall apply:

- 3.3.1. Where such district boundaries are indicated as approximately following centerlines of streets or alleys, lot lines, stream centerlines, property lines or corporate limit lines, such lines shall be considered to be such boundaries.
- 3.3.2. Where a district boundary divides a lot, the location of such boundary, unless the same is indicated by dimensions shown on the map, shall be determined by the use of the scale appearing on the Zoning Map.
- 3.3.3. Authority for each entry made on the map must be found in the applicable Zoning Ordinance or Amendment.

- 3.3.4. The controlling document for determining the zoning classification of any particular property in the City shall be in the Ordinance adopted and enacted by the Council, which zoned or rezoned said parcel.
- 3.3.5. Where physical or cultural features existing on the ground are at variance with those shown on the Zoning Map, or in other circumstances not covered by the preceding rules, the Board of Zoning Adjustment, hereinafter referred to as “the BZA” shall interpret the district boundaries.

§3.4. District Boundaries Established

The boundaries of each district are indicated upon the Zoning Map. Said map and all notations, references and other information shown thereon shall be as much a part of this Ordinance as is fully described herein. Said map shall be retained in the office of the City Clerk.

Article 4 GENERAL REGULATIONS

§4.1. Uses

- 4.1.1. In each district no use other than the specific types specified for that district shall be permitted. Uses not specified as permitted, as Special Exception Uses or as Conditional Uses, are prohibited.
- 4.1.2. No permit shall be issued for Special Exception Uses, as indicated in the district regulations, except with the written approval of the BZA, and subject to such conditions as said BZA may require to preserve and protect the character of the District and otherwise promote the purposes of this Ordinance.

Special Exceptions, unlike variances, do not require a showing of unnecessary hardship. A Special Exception denotes a species of administrative permission that allows property to be used in a manner which the regulations expressly permit and under conditions specified in this Ordinance though it may not be permissibly used as a substitute for a variance. A use prohibited by this Ordinance may not be authorized by Special Exception. See [§12.3 Special Exceptions](#).
- 4.1.3. Any use listed in a district as a Conditional Use shall only be permitted upon approval by the Council upon a recommendation by the Commission in accordance with the procedure set forth in [§13.3 Conditional Uses](#). The recommendation by the Commission may be to approve or deny the application, which said recommendation shall be advisory only. Zoning is a legislative matter decided by the Council. The Council shall not be bound by the recommendation of the Commission.

§4.2. General Lot Regulations

- 4.2.1. Street Access. No structure shall be constructed on a nonconforming lot that does not abut a public street with a minimum right-of-way width of forty (40) ft.
- 4.2.2. Official Street Line. Where an official line has been established for the future widening or opening of a street upon which a lot abuts, such official line shall be considered as the property line.

§4.3. Area and Dimensional Regulations

- 4.3.1. Open Space and Height. In each district each structure hereafter erected or altered shall be provided with the yards specified, shall be on a lot of the area and width specified and shall not exceed the heights specified in the district schedule. No open space or lot required for a building or structure shall during its life be occupied by or counted as open space for another building or structure.
 1. No lot shall be reduced in area so that yards and other open spaces total less than the minimum area required under this Ordinance.
 2. The sale of lots in an unapproved subdivision is prohibited by Title 11-52-33, [Code of Alabama, 1975](#).
- 4.3.2. Dimensional Standards for Residential Zoning Classifications. In any residential district, the dimensional standards normally required shall not apply if modification or variations from these standards are shown on an approved preliminary plot plan or subdivision plat provided the same shall have been first approved by the BZA, or the Commission by the authority vested in it by the Subdivision Regulations.
- 4.3.3. Existing Lots of Record. A single-family dwelling may be constructed on any nonconforming lot in any residential

district if said lot contains less than the minimum lot area required in the applicable district, provided the following condition is met:

1. No structure shall be constructed on a nonconforming lot without front, rear, and side yard setbacks as required in the applicable district.

4.3.4. Lot Width. Minimum lot width shall be measured along the front building line.

4.3.5. Lot Frontage. Lot frontage should be comparable to the minimum lot width. However, where the lot frontage is less than the minimum lot width, the Commission may approve such lots, if having a minimum of forty (40) feet lot frontage, but all building line restrictions shall remain in full force and effect on such irregularly shaped lots, unless otherwise approved by the Commission. In no case shall the minimum lot frontage be less than forty (40) feet except as follows:

1. Townhouses shall have a minimum lot frontage of eighteen (18) feet
2. Lots on culs-de-sac shall have a minimum lot frontage of twenty-five (25) feet, measured along the arc.

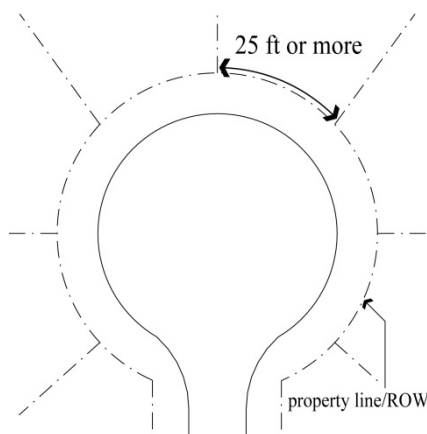


Figure 4.3.5: Lot frontage for cul-de-sacs

3. Non-residential uses in non-residential districts may have a lot frontage width less than forty (40) feet so long as access

to such lot is provided by another frontage greater than forty (40) feet in width, by an alley or by a shared access approved by the Commission.

4.3.6. General Setback Regulations

1. The minimum front yard setback may be reduced where the setbacks of the buildings on abutting lots is less than the normally required front yard setback (see Figure 4.3.6). In such case, the setback may be less than that normally required, but not less than:

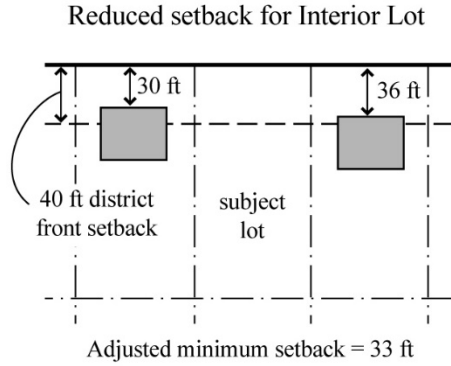
- a. For interior lots, the average of the as-built setbacks on the abutting lots.
- b. For corner lots, the as-built setback on the abutting lot per corresponding frontage.

2. No side yard setback shall be required in excess of twenty-five (25) feet.

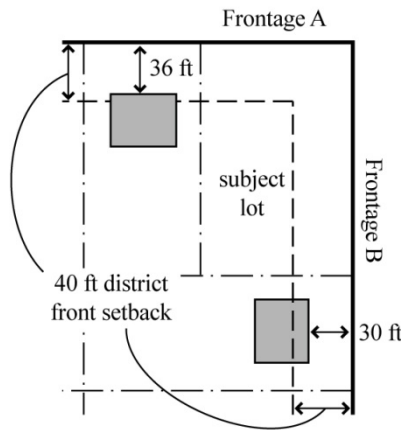
3. For corner lots in single-family residential districts, the minimum front yard setback shall be observed on both lot frontages abutting street rights-of-way (except alleys 16' or less in width), unless otherwise provided by this Ordinance.

4. Every part of a required yard shall be open from its lowest point to the sky unobstructed except for:

- a. Accessory uses conforming to [§4.4 Accessory Structures](#).
- b. Uncovered terraces, decks, steps and porches, which are not, in any part, located within five (5) feet of any abutting lot line zoned R-5, R-6, R-7, R-8 and R-9 only. Uncovered steps and stairs, of any height, may encroach no more than twenty-five (25) percent into a required front yard on a single-family or duplex lot.



Reduced setback for Corner Lot



Adjusted minimum setback on Frontage A = 36 ft
Adjusted minimum setback on Frontage B = 30 ft

Figure 4.3.6 Reduced front yard setbacks

- c. Roof overhangs, projecting into a required yard no more than three (3) feet but in no case shall they project closer than three (3) feet to any property line.
- d. Bay windows, chimneys, window air condition units and similar architectural features or mechanical components of single-family dwellings and duplexes projecting no more than four (4) feet into a required yard. The cumulative width(s) of such encroachments shall not constitute more than ten (10) percent of the total length of the corresponding wall. In no case shall such projections extend nearer than three (3) feet from any abutting lot line.

- e. Mechanical components of central air conditioning systems, irrigation pumps, grinder pumps, or similar mechanical equipment projecting into a required side yard no more than four (4) feet and no closer than five (5) feet to any lot line, except in subdivisions with side setbacks of a minimum of 5' or less or as may be otherwise approved by the Building Official in the case of zero lot line developments.
- f. Moveable awnings attached to and supported by a building wall may be placed over doors or windows in any required yard, but such awnings shall not project closer than five (5) feet to any lot line. Canopies shall provide a clear space between grade level and the bottom of the valance of at least eight (8) feet. See also [§7.2 Gas and Service Stations](#) for gas and service station canopies.

In addition to the aforesaid, a reduction of a front, rear or side yard up to one (1) foot may be approved by the Building Official provided that no portion of the building shall extend closer than three (3) feet to the nearest property line.

- 5. On through lots, the required front yard setback shall be provided on each frontage except where a note appears on a recorded plat prohibiting access to one of the abutting frontages. Along such frontage, the minimum rear yard shall be required per the applicable district.
- 4.3.7. Height Regulations. The maximum building height regulations prescribed in this Ordinance shall not apply to belfries, chimneys, church spires, cooling towers, elevator bulkheads, fire towers, flag poles, television antennae, tanks, water towers, or mechanical equipment rooms that:

1. do not separately or in combination with other rooftop structures exceed ten (10) percent of the horizontal roof area; and
 2. no sign, nameplate, display or advertising device of any kind shall be inscribed upon or attached to any such structure or otherwise erected so as to extend above the roof of the principal structure.
- 4.3.8. Sight Distance Requirements. No planting, fence, building, wall, sign or other structure shall be placed or maintained so as to obstruct the vision of motorists within a clear sight triangle determined by the City Engineer in accordance with the City Public Works and Engineering Standards.

Foundation. Footings and foundations for new constructions and additions installed on a lot or parcel that has an average grade slope exceeding 1/3 shall be designed by a State of Alabama licensed engineer. A geotechnical engineer shall be required to evaluate the site and inspect the footings and foundations.

§4.4. Accessory Structures

- 4.4.1. Time of Construction. No accessory building shall be constructed until the construction of the principal building, to which it is accessory, has been commenced, and no accessory building shall be used unless the principal building is also being used
- 4.4.2. Location
 1. Accessory structures shall be located only in the rear yard and shall not be located nearer than ten (10) feet from the principal dwelling.
 2. Side yard setback. The side yard setback shall be that required of principal structures in the applicable district.

3. Rear yard setback. Accessory structures shall not be located nearer than fifteen (15) feet from the rear lot line.
- 4.4.3. Height. Accessory structures shall not exceed one (1) story in height nor sixteen (16) feet. Greater height may be permitted only by a Special Exception upon request to the BZA in accordance with the provision of [§12.3 Special Exceptions](#).
- 4.4.4. Building Materials. If the accessory structure is a detached minor building consisting of masonry or frame walls and roof, then in such event said minor building shall be constructed with building materials of the same type and kind as used for the construction of the principal structure on the premises.
- 4.4.5. Miscellaneous
 1. The term “accessory structure” shall not include:
 - a. Any use not on the same lot to which it is accessory unless authorized by the Board of Zoning Adjustment.
 - b. Any use not customarily incidental to a permitted use.
 - c. Any use detrimental to a residential neighborhood, if located within a residential area or if abutting residential uses.
 - d. An accessory dwelling except where specifically permitted by this Ordinance.

§4.5. Fences.

- 4.5.1. Visibility. No fence or wall shall be permitted between the building line and the front lot line. Fences shall not be placed within the clear sight triangle as determined by the City Engineer.
- 4.5.2. No fence shall be erected, installed, constructed or otherwise structurally altered in the City except in strict

compliance with the terms and provisions of this ordinance.

4.5.3. Any person, firm, corporation, partnerships or other entity desiring to build a fence on any property located within the City shall follow the procedure and comply with the following requirements:

1. Unless it has been approved as part of a valid Building Permit, no fence shall be erected, installed, constructed or otherwise structurally altered on any property until a fence permit is issued by the City.
2. No approval for the issuance of a permit shall be made until such time as the Building Official and Fire Marshal have approved the plans and specifications for the erection, installation, construction or structural alteration of said wall or fence and certifies that the same meet the requirement of paragraphs 3 and 4 below.
3. The person, firm, corporation, partnership or other entity applying for a permit shall submit plans and specifications for the erection, installation, construction or structural alteration of the fence. The plans and specifications shall include the following:
 - a. A map or survey of the lot upon which the fence will be located.
 - b. The location of the fence on the property
 - c. The dimensions of the fence, including the height, width and length.
 - d. Estimated cost.
 - e. List and description of materials to be used.
4. No fence shall be erected, installed, constructed, or otherwise structurally altered unless the material utilized therefore is such that the grade and

quality of said material is the same on all sides, including the front and back. Materials are limited to chain link, masonry, vinyl, composite, or wood.

5. In all residential zoning districts, fences, regardless of material, shall be no higher than eight feet measured from the ground. Any fence exceeding 8' in height shall require a Conditional Use Approval pursuant to Section 13.3. If Conditional Use Approval is requested, drawings indicating the requested fencing, location, height and materials will be required.
6. In all residential zoning districts, fences may be located between the front building line and the front setback line provided said fences are open, ornamental in style, finished on both sides and excluding any chain link or privacy wood fencing.
7. For security purposes, in all residential zoning districts, fences may be located between the front building setback and the front lot line providing that all of the following criteria are met:
 - a. The residential property must be a lot of record recorded in the Office of the Judge of Probate; and
 - b. The recorded lot must consist of a minimum one (1) acre of property; and
 - c. The primary residential unit constructed upon the property must be located a minimum 100' from the front lot line; and
 - d. The fence and gate shall be constructed so as to be open, ornamental and decorative in style and constructed of finished stone, masonry and/or metal. Said fencing located within the front yard setback shall exclude wood and/or chain link fencing; and

- e. Said fencing shall be located a minimum of 2' inside the front lot line or a minimum of 5' from any public improvements, within the right-of-way, whichever is greater. Said location shall be approved by the City Planner and/or City Engineer in order to mitigate adverse effects to the subject or adjacent properties. NOTE: All public improvements, including utilities, shall be designated on required drawings in the form of a survey and certified by an Engineer and/or Surveyor licensed by the State of Alabama; and
- f. Said security gate shall be set back minimum 40' from the edge of pavement or at least 2' inside of the private property line, whichever is greater; and
- g. A Knox switch/switches shall be installed and gate shall be at proper width in order to allow access for emergency vehicles and shall be approved by Fire Marshall prior to permitting."

§4.6. Ownership and Management of Common Open Spaces and Facilities

For all developments involving the creation of open spaces or facilities to be owned and maintained by a homeowner, property owner, or Condominium association, the following shall apply:

- 4.6.1. Owner's Association. An association representing the owners shall own the common open space or facility in perpetuity. Membership in the association shall be mandatory and automatic for all owners of the subdivision or condominium and their successors. The association shall have lien authority to ensure the collection of dues from all members. The responsibility for maintaining the

common open space and/or facilities located thereon shall be borne by the association.

- 4.6.2. Management Plan. The applicant shall submit a plan for management of open space and/or common facilities that:

1. allocates responsibility and guidelines for the maintenance and operation of the common open space/facilities including provisions for ongoing maintenance and for long-term capital improvements;
2. estimates the costs and staffing requirements needed for maintenance and operation of, and insurance for, the common open space/facilities and outlines the means by which such funding will be obtained or provided;
3. provides that any changes to the plan be approved by the Commission; and
4. provides for enforcement of the plan.

- 4.6.3. In the event the party responsible for maintenance of the common open space/facility fails to maintain all or any portion in reasonable order and condition, the City may take any corrective action, to the extent permitted by law, which is deemed necessary and suitable to remedy the situation.

§4.7. Condominiums

The condominium form of ownership is permitted in any and all Zoning Districts although the area and dimensional regulations for certain districts or uses may not directly relate to such form of property ownership, such as minimum lot areas, widths or yards. Therefore, condominiums shall not be held literally to such regulations; but instead shall be consistent with their intent. For example, if this Ordinance requires a minimum lot area of 10,000 sq. ft. for a particular district or use, such area shall be provided, although it is not within a separately owned lot, and shall not be

counted toward another part of the same development. Similarly, in a district that requires a ten (10) foot side yard setback; there shall be a twenty (20) foot separation between the sides of buildings in a condominium development.

Furthermore, when a district limits the intensity of development to one principal building per lot, such regulations shall not apply literally in the case of condominiums. In such case, more than one such building shall be permitted so long as the minimum (lot) area is provided per principal building.

§4.8. Commercial Vehicles in Residential Districts

In all residential zoning districts, commercial vehicles, as permitted, shall only be parked behind the front building line or within an enclosed structure.

§4.9. Donation Bins

4.9.1. Donation bins may be located on premises in non-residential districts only and shall not, after the effective date of these regulations, be placed on a premises without written approval of the Zoning Official. The following information shall be provided to the Zoning Official with the request for placement:

1. Name, address and phone number of the applicant.
2. Name, address and phone number of the owner of the concerned property and a letter of authority/permission from said owner.
3. Information as to the manner and schedule for which the bin is to be emptied or removed.

4.9.2. Standards. The Zoning Official shall only approve bin placement in accordance with the following:

1. Bins shall be set back as required for principal buildings in the applicable non-residential district and may not encumber any required sight triangle, off-street parking or stacking space, circulation or loading/unloading area, buffer, required yard or landscaping area.
2. All goods shall be regularly removed to avoid overflow and the bin area shall be maintained in a safe, orderly condition.
3. Bins shall not be placed in any manner that conflicts with conditions imposed on the premises through conditional use, special exception use, variance, design review or similar approval.

§4.10. Swimming Pools in Residential Districts

- 4.10.1 In all residential zoning districts, pools shall be constructed within the side and/or rear yards with a minimum setback of 5' from any adjacent property line.
- 4.10.2 All mechanical pool equipment shall be located a minimum of 3' from any adjacent property line.
- 4.10.2 Decks constructed for above ground pools in Residential District R-1, R-2, R-3 and R-4 shall be located within the regular side setbacks of the respective zoning district.

Article 5 RESIDENTIAL DISTRICTS

§5.1. E-2 Residential Estate District

This district is intended to accommodate detached, single-family dwellings on estate-sized lots.

5.1.1. Use Regulations. See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following limitations:

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.1.2. Area and Dimensional Regulations: The area and dimensional regulations set forth following and in Table 5.1 shall be observed (See also [Article 4 General Regulations](#)):

1. Only one principal building and its accessory structures may be built on any lot of record, which, at the time of enactment of this Ordinance, is separately owned.
2. The maximum building height may be increased to three (3) stories, or 45 feet, whichever is less, upon approval of a Special Exception. Such increase in height shall only be permitted upon a favorable recommendation by the Fire Marshal and subject to any conditions required by the Fire Marshal and/or Board, which may include installation of a home fire sprinkler system.

5.1.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements for permitted non-residential uses, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 5.1 E-2 District Area and Dimensional Regulations	
Min. Floor Area	
One Story	2,000 sq. ft.
Two Story	2,000 sq. ft.
Min. Total Floor Area	2,000 sq. ft.
Min. Yard Setbacks	
Front	75 ft
Rear	50 ft
Side	25 ft
Min. Lot Area	1 acre
Min. Lot Width	150 ft
Max. Building Height (see also §5.1.2.2)	35 ft or 2 ½ stories, whichever is less
Max. Building Area	
On percent of lot	25%

§5.2. R-1 Low Density Residential District

The district is intended to accommodate detached, single-family dwellings on large lots together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

2. For parking requirements, see [Article 8](#).
3. For landscaping requirements for permitted non-residential uses, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

5.2.1. Use Regulations. See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following limitations:

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.2.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.2 shall be observed (See also [Article 4 General Regulations](#)):

1. Only one main structure and its accessory buildings may be built on any lot of record, which, at the time of enactment of this Ordinance, is separately owned.
2. On no lot separately owned shall the aggregate width of required side yards be such that less than twenty-four (24) feet of the width of the lot be left to build upon after side yard requirements are observed.
3. The maximum building height may be increased to three (3) stories, or 45 feet, whichever is less, upon approval of a Special Exception. Such increase in height shall only be permitted upon a favorable recommendation by the Fire Marshal and subject to any conditions required by the Fire Marshal and/or Board, which may include installation of a home fire sprinkler system.

5.2.3. Development Standards.

1. For accessory structures, see [§4.4](#).

Table 5.2 R-1 District Area and Dimensional Regulations	
Min. Floor Area	2,000 sq. ft.
Min. Yard Setbacks	
Front	60 ft
Rear	30 ft
Side	17 ft
Min. Lot Area	20,000 sq. ft.
Min. Lot Width	115 ft
Max. Building Height (see also §5.2.2.3)	35 ft or 2 ½ stories, whichever is less
Max. Building Area	
On percent of lot	30%

§5.3. R-2 Medium Density Residential District

This district is intended to accommodate detached, single-family dwellings on moderately-sized lots together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

5.3.1. Use Regulations: See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.3.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.3 shall be observed (See also [Article 4 General Regulations](#)):

1. Only one main structure and its accessory buildings may be built on any lot of record, which, at the time of enactment of this Ordinance, is separately owned.
2. On no lot separately owned shall the aggregate width of required side yards be such that less than twenty-four (24) feet of the width of the lot be left to build upon after side yard requirements are observed.

5.3.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements for permitted non-residential uses, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 5.3 R-2 District Area and Dimensional Regulations	
Min. Floor Area	1,600 sq. ft.
Min. Yard Setbacks	
Front	50 ft
Rear	30 ft
Side	15 ft
Min. Lot Area	15,000 sq. ft.
Min. Lot Width	100 ft
Max. Building Height	35 ft or 2 ½ stories, whichever is less
Max. Building Area	
On percent of lot	30%

§5.4. R-3 Medium Density Residential District

This district is intended to accommodate detached, single-family dwellings on moderately-sized lots together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

5.4.1. Use Regulations: See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.4.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.4 shall be observed (See also [Article 4 General Regulations](#)):

1. Only one main structure and its accessory buildings may be built on any lot of record, which, at the time of enactment of this Ordinance, is separately owned.
2. On no lot separately owned shall the aggregate width of required side yards be such that less than twenty-four (24) feet of the width of the lot be left to build upon after side yard requirements are observed.

5.4.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements for permitted non-residential uses, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 5.4 R-3 District Area and Dimensional Regulations	
Min. Floor Area	1,400 sq. ft.
Min. Yard Setbacks	
Front	50 ft
Rear	30 ft
Side	15 ft
Min. Lot Area	15,000 sq. ft.
Min. Lot Width	100 ft
Max. Building Height	35 ft or 2 ½ stories, whichever is less
Max. Building Area	
On percent of lot	30%

§5.5. R-4 Medium Density Residential District

This district is intended to accommodate detached, single-family dwellings on moderately-sized lots together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

5.5.1. Use Regulations: See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.5.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.5 shall be observed (See also [Article 4 General Regulations](#)):

1. Only one main structure and its accessory buildings may be built on any lot of record, which, at the time of enactment of this Ordinance, is separately owned.
2. On no lot separately owned shall the aggregate width of required side yards be such that less than twenty-four (24) feet of the width of the lot be left to build upon after side yard requirements are observed.

5.5.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements for permitted non-residential uses, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 5.5 R-4 District Area and Dimensional Regulations	
Min. Floor Area	1,200 sq. ft.
Min. Yard Setbacks	
Front	40 ft
Rear	25 ft
Side	10 ft
Min. Lot Area	12,000 sq. ft.
Min. Lot Width	70 ft
Max. Building Height	35 ft or 2 ½ stories, whichever is less
Max. Building Area	
On percent of lot	30%

§5.6. R-5 Multi-family Residential District

This district is intended to accommodate multi-family dwellings together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

5.6.1. Use Regulations: See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.6.2. Area and Dimensional Regulations. The area and dimensional regulations set forth in Table 5.6 shall be observed (See also [Article 4 General Regulations](#)).

5.6.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 5.6 R-5 District Area and Dimensional Regulations	
Min. Living Area per Dwelling Unit	1,000 sq. ft.
Min. Yard Setbacks	
Front	25 ft
Rear	30 ft
Side	20 ft
Min. Lot Area	17,500 sq. ft for first 4 units plus 3,500 sq. ft. per additional unit
Max. Building Height	40 ft or 3 stories, whichever is less
Min. Building Group Spacing	
Front-to-front	40 ft
Front-to-side	30 ft
Front-to-back	50 ft
Back-to-back	40 ft
Side-to-back	30 ft
Side-to-side	20 ft
Any other situation	16 ft
Max. Building Area	
On percent of lot	35%

§5.7. R-6 Zero Lot Line Residential District

This district is intended to accommodate detached, single-family dwellings on small lots together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

5.7.1. Use Regulations: See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.7.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.7 shall be observed (See also [Article 4 General Regulations](#)):

1. Only one main structure and its accessory buildings may be built on any lot of record, which, at the time of enactment of this Ordinance, is separately owned.
2. Accessory structures and uses customarily incidental to single family uses are permitted in the rear yard only, subject to [§4.4](#).

5.7.3. Development Standards.

1. Homes may be attached with patio fence or wall in order to achieve privacy between homes.
2. For accessory structures, see [§4.4](#).
3. For parking requirements, see [Article 8](#).
4. For landscaping requirements for permitted non-residential uses, see [Article 9](#).
5. For sign regulations, see [Article 11](#).

Table 5.7 R-6 District Area and Dimensional Regulations ^(Notes)	
Min. Floor Area	
One story	1,000 sq. ft.
Two story first floor total	700 sq. ft. 1,100 sq. ft.
Min. Yard Setbacks	
Front	12 ft ⁽¹⁾
Rear	20 ft
Side	0/10 ft ⁽²⁾
Min. Lot Area	4,000 sq. ft.
Min. Lot Width	40 ft
Maxi. Building Height	35 ft or 2 ½ stories, whichever is less
Max. Density	4 DU/acre ⁽³⁾
Min. Dwelling Spacing	
Front-to-front	40 ft
Front-to-side	20 ft
Front-to-back	40 ft
Back-to-back	40 ft
Side-to-back	30 ft
Side-to-side	10 ft
¹ Front yard setback shall be measured from the outside edge of the gutter, curb or edge of pavement, or back of sidewalk, where required, whichever is greater, but under no circumstances within the right-of-way of any dedicated street. ² One side yard with no (zero) setback is permitted, provided however the total of setbacks of both sides shall be at least ten (10) ft. Building separation, in any case, shall comply with City Building and Fire Codes. ³ Included in the calculations shall be all parts of the development including, but not limited to, common areas, streets and public improvements, park areas, etc.	

§5.8. R-7 Duplex and Triplex Residential District

This district is intended to accommodate detached, single-family dwellings on small lots, duplexes and triplexes together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

5.8.1. Use Regulations: See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.8.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.8 shall be observed (See also [Article 4 General Regulations](#)):

1. Accessory structures and uses are permitted in the rear yard only.

5.8.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements for permitted non-residential uses, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

5.8.4. Procedures for creating an R-7 District. See [§13.4 Amendments](#).

Table 5.8 R-7 District Area and Dimensional Regulations ^(Notes)	
Min. Floor Area	
One story	1,000 sq. ft.
Two story first floor total	700 sq. ft. 1,100 sq. ft.
Min. Yard Setbacks	
Front	12 ft ⁽¹⁾
Rear	25 ft
Side	10 ft
Min. Lot Area	3,750 sq. ft. ⁽²⁾
Min. Lot Width	40 ft
Max. Building Height	35 ft or 2 ½ stories, whichever is less
Min. Dwelling Spacing	
Front-to-front	40 ft
Front-to-side	20 ft
Front-to-back	50 ft
Back-to-back	40 ft
Side-to-back	30 ft
Side-to-side	
Multi-unit	20 ft
Single-unit	10 ft
Any other situation	16 ft
¹ Front yard setback shall be measured from the outside edge of curb or back of sidewalk, where required, but under no circumstances within the right-of-way of any dedicated street. ² May include common area.	

§5.9. R-8 Townhouse Residential District

This district is intended to accommodate detached single-family dwellings and townhouses, together with other uses, as may be permitted on appeal, which are compatible with such residential uses.

5.9.1. Use Regulations: See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Only low intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.9.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.9 shall be observed (See also [Article 4 General Regulations](#)):

1. That portion of the façade containing a front-loaded garage shall be set back twenty (20) feet from the back of sidewalk. Driveways in front yards shall not take up more than fifty (50) percent of the front yard, as provided. Narrow lots may require rear access.
2. Customary accessory buildings or structures are permitted provided such use is located in rear yard.

5.9.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements, see [Article 9](#).
4. For sign regulations, see [Article 11](#).
5. Procedures for creating an R-8 District. See [§13.4 Amendments](#).

Table 5.9 R-8 District Area and Dimensional Regulations ^(Notes)	
Min. Floor Area	
One story	1,000 sq. ft.
Two story first floor total	800 sq. ft. 1,200 sq. ft.
Min. Yard Setbacks	
Front	12 ft ⁽¹⁾
Rear	20 ft
Side	none
Min. Lot Area	1,250 sq. ft.
Min. Average Lot Area	4,360 sq. ft.
Min. Lot Width	18 ft
Max. Building Height	35 ft or 2 ½ stories, whichever is less
Min. Building Group Spacing	
Front-to-front	40 ft
Front-to-side	30 ft
Front-to-back	50 ft
Back-to-back	40 ft
Side-to-back	30 ft
Side-to-side	20 ft
Any other situation	16 ft
¹ Front yard setback shall be measured from the back of curb or back of sidewalk, where required, but under no circumstances within the right-of-way of any dedicated street.	

§5.10. R-9 Planned Residential District

This district is intended to accommodate a range of residential uses, which may be selected from, combined and distributed within a site as is most appropriate to the location, access, context and natural character of the area. The R-9 District also provides for a limited number of non-residential uses, as may be permitted in appeal, which are compatible with residential uses.

- 5.10.1. Use Regulations. See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following limitations:
 1. Only low and medium intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.
- 5.10.2. Area and Dimensional Regulations. For the following uses, the area and dimensional regulations set forth for the corresponding district shall be observed (See also [Article 4 General Regulations](#)).
 1. Single-family dwellings (E-2, R-1, R-2, R-3, R-4 and R-6)
 2. Townhouse dwellings (R-8)
 3. Duplexes and triplexes (R-7)
- 5.10.3. Development Standards.
 1. For parking requirements, see [Article 8](#).
 2. For landscaping requirements, see [Article 9](#).
 3. For sign regulations, see [Article 11](#).
- 5.10.4. Procedures for creating an R-9 District. See [§13.4 Amendments](#).

§5.11. RC-1 Residential District

5.11.1. Use Regulations See [Table 5](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following limitations:

1. Only low and medium intensity institutional uses shall be permitted and only by Special Exception per [§12.3](#) or as Conditional Uses per [§13.3](#), as indicated in Table 5.

5.11.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 5.11 shall be observed (See also [Article 4 General Regulations](#)):

1. For the purposes of this §5.11, stories shall mean levels of livable floor space, which are all above ground.

5.11.3. Development Standards.

1. For parking requirements, see [Article 8](#).
2. For landscaping requirements, see [Article 9](#).
3. For sign regulations, see [Article 11](#).

Table 5.11 RC-1 District Area and Dimensional Regulations ^(Notes)	
Min. Floor Area	
Average	1,200 sq. ft.
1-BR unit	800 sq. ft.
2-BR unit	1,250 sq. ft.
3-BR unit	1,500 sq. ft.
Min. Yard Setbacks	
Front	30 ft
Rear	30 ft
Side	20 ft
Min. Land Size	20,000 sq. ft.
Min. Average Lot Area	4,000 sq. ft. ⁽¹⁾
Max. Building Height	35 ft or 2 ½ stories, whichever is less
Max. Building Area	
On percent of lot	35%
¹ Calculation includes common area.	

Table 5 Use Regulations for Residential Districts											
USES / DISTRICTS:	E-2	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8	R-9	RC-1
RESIDENTIAL											
Accessory Dwelling, §7.8	Y										
Assisted Living Facility						C				C	
Duplex								Y		Y	Y
Conservation Subdivision, §7.3	Y	Y	Y	Y	Y					Y	
Family Day Care Home, §7.7	Y	Y	Y	Y	Y		Y				
Group Home						C				C	
Home Occupation, §7.1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Independent Living Facility						Y				C	
Multi-family dwelling						Y				Y	C
Single-family dwelling, detached	Y	Y	Y	Y	Y		Y			Y	
Townhouse									Y	Y	Y
Triplex								Y		C	
LODGING											
Bed and Breakfast	C	C	C	C	C					C	C
INSTITUTIONAL											
Day Care Center, §7.7										C	
Nursing Home						C					
Place of Assembly	C	C	C	C	C	C	C	C	C	C	
Public Facility	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Public Utility Facility	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
School, Not-for-Profit	C	C	C	C	C	C	C	C	C	C	C
School, Public or Private	C	C	C	C	C	C	C	C	C	C	C
OTHER											
Country Club	C	C	C	C	C					C	
Parks, Gardens, Playgrounds	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Telecommunications Facilities, §7.9	C	C	C	C	C	C	C	C	C	C	C
<p>Y – The use is permitted by right. L – Permitted by right as limited by district regulations SE – Special Exception Use, requires approval by BZA (see §12.3). May also be subject to district limitations. C – Conditional Use, requires approval by the Council (see §13.3). May also be subject to district limitations. A use followed by a numeric cross-reference is subject to Use-Specific Regulations in Article 7. A blank cell indicates that the use is not permitted.</p>											

Article 6 NON-RESIDENTIAL DISTRICTS

§6.1. A-Agriculture District

This district is intended to promote the continued use of open, unsubdivided lands for agriculture and low-density residential use as well as non-residential uses, as may be permitted on appeal, which are compatible with the conservation of such semi-rural uses and land areas.

6.1.1. Use Regulations: See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following limitations.

1. Stables and Farms shall only be permitted on lots of one (1) acre or larger.
2. Only low and medium intensity institutional uses may be approved and only as Special Exceptions per [§12.3](#) or as Conditional Uses per [§13.3](#) as indicated in Table 6.

6.1.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 6.1 shall be observed (See also [Article 4 General Regulations](#)):

1. Only one main structure and its accessory buildings may be built on any lot of record, which at the time of enactment of this ordinance, is separately owned.
2. Livestock and fowl shall not be housed, fed or watered within 150 feet from the boundary of another district nor 300 feet of the nearest existing residence on any abutting or adjacent property.
3. Piles of feed or bedding shall be located no closer than 100 feet from a right-of-way line, property line to minimize odor and nuisance problems.
4. Manure shall be stored for removal and disposed of in accordance with all

applicable county, state and federal regulations. No manure piles shall be located closer than 100 feet from a right-of-way line, property line, zoning district boundary, wetland, watercourse or other water body.

Table 6.1 A District Area and Dimensional Regulations	
Min. Floor Area	1,400 sq. ft.
Min. Yard Setbacks	
Front	40 ft
Rear	30 ft
Side	15 ft
Min. Lot Area	20,000 sq. ft.
Min. Lot Width	100 ft
Max. Building Height	40 ft or 3 stories, whichever is less
Max. Building Area	
On percent of lot	25%
Rear yard percentage	30%
¹ Calculation includes common area.	

6.1.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

§6.2. B-1 Neighborhood Business District

This district is intended to accommodate non-residential uses of a scale and in such locations as to be compatible with and conveniently serve the day-to-day needs of adjacent neighborhoods.

6.2.1. Use Regulations: See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

1. Retail, service and office uses shall be limited to a maximum gross floor area of 10,000 sq. ft. per establishment. However, additional floor area up to 25,000 sq. ft. may be approved as a Conditional Use per [§13.3](#).
2. Only low and medium intensity institutional uses may be approved and only as Special Exceptions per [§12.3](#) or as Conditional Uses per [§13.3](#) as indicated in Table 6.

6.2.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 6.2 shall be observed (See also [Article 4 General Regulations](#)):

1. Side yard setbacks shall not be required; however, wherever a building is set back from the side lot line, such setback shall be as required by the Building Code and landscaping as required by [§9.2](#) shall be provided.

6.2.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 6.2 B-1 District Area and Dimensional Regulations	
Min. Yard Setbacks	
Front	20 ft
Rear	30 ft
Side	0-10 ft, see §6.2.2.1
Max. Building Height	35 ft or 3 stories, whichever is less

§6.3. B-1.2 Planned Neighborhood Mixed Use District

This district is intended to accommodate a range of mutually supportive residential and neighborhood-scale non-residential and mixed uses developed in a pedestrian-friendly pattern. Such development is further intended to be located and designed so as to be convenient to and compatible with adjacent neighborhoods.

Council approval of the application for B-1.2 zoning will include approval of the development plan, including, site plan and setbacks, renderings, and other public improvements. The Zoning Official, Building Official, and City Engineer may approve incidental changes, however, substantial changes to the approved plan (i.e. increased density, amended layout, change of use, etc.) may only be approved by Council following recommendation of the Planning and Zoning Commission.

6.3.1. Use Regulations: See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following limitations.

1. Retail, service and office uses shall be limited to a maximum gross floor area of 10,000 sq. ft. per establishment. However, additional floor area up to 25,000 sq. ft. may be approved as a Conditional Use per [§13.3](#).
2. Only low and medium intensity institutional uses may be approved and only as Special Exceptions per [§12.3](#) or as Conditional Uses per [§13.3](#) as indicated in Table 6.

6.3.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 6.3 shall be observed (See also [Article 4 General Regulations](#)):

1. Front Yards.

- a. When separated from the nearest boundary of any single-family residential district by more than 200 feet or by a street right-of-way, no front yard setback shall be required. Otherwise, the minimum front yard setback shall be twenty (20) feet.
 - b. Buildings may be required to be set back as needed to provide a sidewalk as required in §6.3.3.1.
2. Side yard setbacks shall not be required; however, wherever a building is set back from the side lot line, such setback shall be as required by the Building Code and landscaping as required by [§9.2](#) shall be provided.

Table 6.3 B-1.2 District Area and Dimensional Regulations	
Min. Yard Setbacks	
Front	see §6.3.2.1
Rear	0-15 (depending on buffer if required) ft
Side	see §6.3.2.2
Max. Building Height	35 ft

6.3.3. Development Standards.

1. All buildings shall have a sidewalk a minimum five (5) to eight (8) feet width along the lot frontage as determined and approved by the City Engineer. Additional right-of-way or a sidewalk easement shall be provided along the lot frontage, if necessary, to accommodate the required sidewalk width.
2. Residential uses, if located within fifteen (15) feet or less of a front lot line, shall be raised at least two (2) feet above grade level.
3. Residential and non-residential uses shall not be located on the same floor of the same building.
4. No vehicular use area, other than a driveway, shall be permitted forward of

any front building line without
Conditional Use approval per [§13.3](#).

5. For accessory structures, see [§4.4](#).
6. For parking requirements, see [Article 8](#).
Abutting on-street parking spaces may be counted toward these requirements.
7. Landscaping shall be provided as required in [Article 9](#) except as follows;
 - a. Landscaping shall not be required at the building front when the building is built up to the public sidewalk. If the building is set back, the front yard shall be (1) designed and improved as an extension of the sidewalk; (2) designed and improved as a plaza; (3) landscaped as required in [§9.2](#) Site Landscaping; or (4) a combination of these.
 - b. Buffers shall not be required between developments within the B-1.2 District but shall required between B-1.2 District developments and uses located outside of the district, as applicable.
8. For sign regulations, see [Article 11](#).

§6.4. B-2 General Business District

This district is intended to accommodate a wide range of non-residential uses in locations convenient to large sections of the community.

6.4.1. Use Regulations: See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following.

- 1. Manufacturing incidental to a retail business where articles are sold at retail on the premises may be permitted as a Special Exception per [§12.3](#).

6.4.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in Table 6.4 shall be observed (See also [Article 4 General Regulations](#)):

- 1. Side yard setbacks shall not be required; however, wherever a building is set back from the side lot line, such setback shall be as required by the Building Code and landscaping as required by [§9.2](#) shall be provided.

6.4.3. Development Standards.

- 1. For accessory structures, see [§4.4](#).
- 2. For parking requirements, see [Article 8](#).
- 3. For landscaping requirements, see [Article 9](#).
- 4. For sign regulations, see [Article 11](#).

Table 6.4 B-2 District Area and Dimensional Regulations	
Min. Yard Setbacks	
Front	30 ft
Rear	30 ft
Side	0-10 ft, see §6.4.2.1
Max. Building Height	45 ft or 4 stories, whichever is less

§6.5. B-3 Conditional Business District

This district is intended to accommodate a wide range of business uses as well as certain non-residential uses that are generally incompatible with the other districts within this Ordinance. Thus the District provides a mechanism through which such uses may be reviewed by the Commission and Council, who may impose conditions upon such development to mitigate incompatibilities with surrounding development.

6.5.1. Use Regulations: See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses.

6.5.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in [Table 6.5](#) shall be observed (See also [Article 4 General Regulations](#)):

1. Side yard setbacks shall not be required; however, wherever a building is set back from the side lot line, such setback shall be as required by the Building Code and landscaping as required by [§9.2](#) shall be provided.

6.5.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 6.5 B-3 District Area and Dimensional Regulations	
Min. Yard Setbacks	
Front	30 ft
Rear	30 ft
Side	0-10 ft, See §6.5.2.1
Max. Building Height	5 stories

§6.6. O-1 Office Park District

This district is intended to accommodate office buildings of limited scale and intensity in locations easily accessible to the overall community.

6.6.1. Use Regulations: See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following limitations.

- 1. No storage (except of samples for display purposes), manufacture, repair or delivery of merchandise thereon or therefrom shall be permitted. This shall not apply to said activities when they are incidental to a permitted use and completely contained within the interior of the building or tenant space housing the principal use.

6.6.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in [Table 6.6](#) shall be observed (See also [Article 4 General Regulations](#)):

6.6.3. Development Standards.

- 1. For accessory structures, see [§4.4](#).
- 2. For parking requirements, see [Article 8](#).
- 3. For landscaping requirements, see [Article 9](#).
- 4. For sign regulations, see [Article 11](#).

Table 6.6 O-1 District Area and Dimensional Regulations	
Min. Yard Setbacks	
Front	30 ft
Rear	30 ft
Side	20 ft
Min. Lot Area	10,000 sq. ft.
Min. Lot Width	100 ft
Max. Building Height	35 ft or 2 stories, whichever is less
Max. Building Area	
With basement parking	30%
Without basement parking	25%

§6.7. O-2 Office Park District

This district is intended to accommodate large-scale, intensive office development in locations easily accessible to the overall region.

6.7.1. Use Regulations: See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following use limitations.

1. No Storage (except of samples for display purposes), manufacture, repair or delivery of merchandise thereon or therefrom shall be permitted. This shall not apply to said activities when they are incidental to a permitted use and completely contained within the interior of the building or tenant space housing the principal use.

6.7.2. Area and Dimensional Regulations. The area and dimensional regulations set forth following and in [Table 6.7](#) shall be observed (See also [Article 4 General Regulations](#)):

1. The maximum building height shall be four (4) stories. However, additional building height up to ten (10) stories may be approved by the Council through Conditional Use review per [§13.3](#). Additional building height shall only be permitted in accordance with the following findings:
 - a. The location of the building is a sufficient distance from any single-family residential districts to mitigate incompatibility.
 - b. The capacity of the existing street network and any proposed improvements will be sufficient to serve the additional traffic without undue disruption of current traffic.
 - c. The location and available fire protection services are sufficient to

effectively serve the proposed development.

6.7.3. Development Standards.

1. For accessory structures, see [§4.4](#).
2. For parking requirements, see [Article 8](#).
3. For landscaping requirements, see [Article 9](#).
4. For sign regulations, see [Article 11](#).

Table 6.7 O-2 District Area and Dimensional Regulations	
Min. Yard Setbacks	
Front	40 ft
Rear	30 ft
Side	20 ft
Min. Lot Area	25,000 sq. ft.
Min. Lot Width	100 ft
Max. Building Height	4 - 10 stories, see §6.7.2.1
Maximum Building Area	
With basement parking	30%
Without basement parking	25%

§6.8. INST Institutional District

This district is intended to accommodate institutional uses that, due to their scale and related impacts, are not compatible with residential use and are therefore generally to be developed in highly accessible locations and/or outside of established neighborhoods.

6.8.1. Use Regulations. See [Table 6](#) (at the end of this Article) for Permitted Uses, Special Exception Uses, and Conditional Uses and the following use limitations:

- 1. No party may alter, expand or extend existing buildings nor construct new ones for the purpose of establishing a use not permitted within the INST District.

6.8.2. Area and Dimensional Regulations. The area and dimensional regulations set forth in Table 6.8 shall be observed (See also [Article 4 General Regulations](#)):

6.8.3. Development Standards.

- 1. For accessory structures, see [§4.4](#).
- 2. For parking requirements, see [Article 8](#).
- 3. For landscaping requirements, see [Article 9](#).
- 4. For sign regulations, see [Article 11](#).

6.8.4. Exemptions.

- 1. Any and all real property located within the corporate City Limits, which was developed as a place of worship, municipal building or facility, school or hospital on or before October 16, 1978, is exempt from these regulations.
- 2. The purpose of this provision is to establish that any and all places of worship, municipal buildings or facilities, school or hospitals which had developed in the City prior to the adoption of Ordinance Number 445 and were at said time rezoned to the INST District, may continue to use said property, either in whole or in part, and

have the right to continue its operations on said property without further proceedings. Said places of worship, municipal buildings and facilities, schools and hospitals may continue the lawful use of said land and structures located thereon, existing on and prior to October 16, 1978. As such, any structure may be built, enlarged, extended, reconstructed or structurally altered on said land for any lawful purpose permitted on said land under the Zoning Ordinance in force and effect on and prior to October 16, 1978.

- 3. The regulations herein shall apply only to that real estate within the INST District developed subsequent to October 16, 1978.

Table 6.8 INST District Area and Dimensional Regulations	
Min. Yard Setbacks	
Front	50 ft
Rear	50 ft
Side	35 ft
Max. Building Height	45 ft or 3 stories, whichever is less

§6.9. Planned Unit Development (PUD)

6.9.1. Intent.

Planned unit development (“PUD”) is a method of development which permits more than one use to be developed on a tract of land, in part or whole, in accordance with an approved Master Development Plan, the intent of which is to:

1. Promote a sense of community, permit flexibility and consequently more creative and imaginative design to accommodate planned associations of uses developed as integral land use units such as office parks or complexes, commercial uses, service centers, residential developments of multiple or mixed housing, including multi-family dwellings, attached and detached single-family dwellings, or any appropriate combination of uses which may be planned, developed or operated as integral land use units;
2. Permit higher than typical densities of land in areas within the PUD in conjunction with provisions for more expansive functional open space and community services;
3. Promote the efficient use of land to facilitate a more economic arrangement of uses, buildings, traffic circulation systems and utilities;
4. Combine and coordinate uses, building forms, building relationships, and architectural styles within the PUD;
5. Promote the preservation and enhancement of existing natural landscape features, their scenic qualities and amenities to the greatest extent possible, and utilize such features in a harmonious fashion;
6. Exempt a development from the conventional zoning regulations

regarding setbacks, minimum yard size, minimum greenbelts, off-street parking regulations, minimum floor areas, and other regulations to achieve the intent described herein;

7. Give the developer reasonable assurance of ultimate approval before beginning final engineering work while providing City officials with reasonable assurance that the development will retain the character envisioned at the time of concurrence; and
8. Promote privacy by permitting the use of gates to control access on private streets, subject to approval by the City as part of the PUD and subdivision review process.

6.9.2. Application and Requirements for PUD.

1. Submission of Application. The property owner (or his/her/its duly appointed representative) of a tract of land shall submit to the City Clerk, a minimum of twenty-five (25) working days prior to a regularly scheduled Commission meeting, an application for approval of a PUD, which shall meet the requirements of this §6.9.
2. Area Requirements. Except when the Master Development Plan of an existing approved PUD is amended by the original applicant, or his/her/its successors or assigns, to include additional area as provided in §6.9.9.3 hereof, any tract of land to be zoned PUD shall have a minimum of seventy-five (75) acres.
3. Contents of Application. The application submitted in accordance with this §6.9 shall contain the following:
 - a. Application Fee. A fee to defray the cost of processing the application, as set from time to time by the Council. Applicant shall be responsible for all

- costs of notification and advertisement incurred.
- b. Owners. List of owners of the property. Any material change in the owners of the property shall be submitted to the City Clerk within sixty (60) days after such change.
 - c. Plan. A Master Development Plan of the PUD and any maps necessary to show the following information:
 - (1) The direction of north, appropriate scale and topography (in no greater than ten (10) feet contour intervals), waterways, flood plains, wetlands, forest cover and known areas of subsurface mining or environmental hazards;
 - (2) The location of the various land uses by PUD land use districts as listed in §6.9.5 hereof;
 - (3) The location of any existing and proposed public or private streets, greenbelts, buffers, natural or man-made open spaces, schools, parks and community service areas within and adjacent to the project area; and
 - (4) The location of any proposed gates for control of access on public and private streets.
 - 4. Planning Criteria. The application shall also include the following written statements and other matters:
 - a. A legal description of the total site proposed for the PUD;
 - b. A general description of the surrounding area, including current zoning and/or land uses;
 - c. A statement of planning objectives to be achieved by the PUD through the particular approach proposed by the applicant. The statement should include a description of the character of the proposed development and the rationale behind the assumptions and projections made by the applicant in relation to the over-all community growth;
 - d. Of the development is to be in phases or stages, a general discussion of how the phases or staging is to proceed and an estimated date when the PUD will begin;
 - e. General delineation of the various land use districts within the PUD, indicating for each such district its general size in terms of estimated total number of acres, with the exact boundaries of each such area to be determined by plat approved by the Commission;
 - f. A calculation of the residential density in dwelling units per gross acre including interior roadways, and including maximum density in units per acre, and densities for all other land use districts within the PUD;
 - g. Development criteria which shall include:
 - (1) setbacks or other location methods, minimum finished floor areas, sign criteria, building heights, off-street parking requirements for each proposed land use district, and/or any other development criteria which the applicant may proposed, and
 - (2) a general discussion of loading areas, greenbelts and buffers;
 - h. Proposed plans for open space;
 - i. Availability and accessibility if transportation, water supply and sewage disposal to the property;
 - j. General statement regarding the ownership and maintenance of common areas and/or common open space;
 - k. Documentation of any protective and/or restrictive covenants, homeowner or business associations

and architectural review committees, if any, and a discussion of their functions;

- l. A general statement concerning any planned street/subdivision sign designs, including street, traffic and informational signs or other standards;
- m. Any planned interim uses of any portion of the property;
- n. A traffic study, if required by the City Engineer;
- o. Landscaping criteria; and
- p. Any proposed modification of existing subdivision regulations as applicable to the PUD.

6.9.3. Other Regulations Not Applicable.

It is the intent of this §6.9 that the PUD application shall set forth development criteria applicable to the property and that flexibility shall be allowed in the construction of improvements thereon. Accordingly, for the purposes of this §6.9, [Articles 5 and 6, §4.4 Accessory Structures](#) (except as set forth in §6.9.6) of this Zoning Ordinance, shall not apply to this §6.9. The applicability of the City Subdivision Regulations shall be subject to any modifications approved pursuant to §6.9.2.4.p above.

6.9.4. Review Procedure.

1. General. The application shall be reviewed as provided in [§13.4](#) of this Zoning Ordinance.
2. Approval. Approval of the application for the PUD by the Council shall be an approval of (a) the Master Development Plan and (b) the planning criteria of the application (collectively, the “Plan”). The developer of the PUD may proceed with the development of the property in accordance with the Plan, and no further approvals shall be required except as set forth in §6.9.9 hereof.

6.9.5. PUD Land Use Districts

The following PUD land use districts shall apply to all or part of a PUD.

1. Planned Single-Family Residential (PR-1).
 - a. Permitted Uses. Attached or detached single-family residential dwellings (including, without limitation, cluster residential, garden homes, duplexes, and townhouses); open spaces; parks; tot lots; swimming pools; picnic areas; tennis courts; community buildings; public playgrounds; municipal fire and/or police stations; golf courses and/or country clubs (if shown on the Plan); home occupations (as defined in §7.1); non-residential child and/or adult day-care centers; residential information offices; wastewater effluent spray irrigation fields (if shown on the Plan); and accessory structures and uses customarily incidental to such permitted uses.
 - b. Conditional Uses. Public, private or parochial schools, but not providing residential accommodations; places of worship; museums; libraries; art galleries; recreational facilities operated on a nonprofit basis; golf courses and country clubs (if not shown on the Plan); convenience commercial uses; wastewater effluent spray irrigation fields (if not shown on the Plan); and other uses not listed in this §6.9.5.1 as may be approved by the Council following the recommendation of the Commission.
 - c. Maximum Building Height. Buildings in the PR-I District shall not exceed three (3) stories in height and shall conform to the City Building Code, Fire Code and Fire Prevention Code, as adopted and amended by the City.
 - d. Special Setback Requirement. Unless otherwise approved by the

Commission, any single-family residential dwelling constructed in a PR-1 land use district must be, at the time of initial construction, located or situated:

- (1) Not less than three hundred (300) feet from any then existing building in any other land use district in the Plan, which exceeds three (3) stories in height but does not exceed six (6) stories in height; and
- (2) Not less than five hundred (500) feet from any then existing building in any other land use district in the Plan, which exceeds six (6) stories in height.

This requirement shall apply only to the initial construction of a single-family residential dwelling in a PR-1 land use district, and specifically shall not apply to subsequent additions to or modifications of such single-family residential dwelling, nor to any reconstruction in the event of partial or total destruction to such single-family dwelling due to a fire or other casualty.

- 2. Planned Multi-family Residential (PR-2).
 - a. Permitted Uses. Multi-family dwellings and accessory structures; those permitted and conditional uses allowed by PR-1; municipal fire and/or police stations and uses customarily incidental to such permitted uses.
 - b. Conditional Uses. Nursing homes; independent living facilities; assisted living facilities; professional offices; and other uses not listed in this §6.9.5.2 as may be approved by the Council following recommendation by the Commission.
 - c. Maximum Building Height. Unless approved as a conditional use:

- (1) When a building is to be constructed within three hundred (300) feet of a single-family residential dwelling in a PR-1 land use district existing at the time of the issuance of a Building Permit for said building, said building shall not exceed three (3) stories in height.
- (2) When a building is more than three hundred (300) feet but less than five (500) feet from a single-family residential dwelling in a PR-1 land use district existing at the time of the issuance of a Building Permit for said building, said building shall not exceed six (6) stories in height.
- (3) No building shall exceed ten (10) stories in height.

In the event a building is destroyed by fire or other casualty, such building may be rebuilt or reconstructed up to its original height without regard to the distance between such building and any single-family residential dwelling built after the commencement of the initial construction of such building.

All buildings shall conform to the City Building Code, Fire Code and Fire Prevention Code as adopted by the City.

- 3. Planned Office (PO).
 - a. Permitted Uses. Public buildings, places of worship, banks and other lending institutions; municipal fire and/or police stations; professional offices ; and offices used exclusively for office purposes, wherein retail or wholesale trade or business is not conducted or wherein no merchandise or products are manufactured, stored, handled, conveyed, sold or otherwise disposed of, together with usual related support businesses (such as, but not limited to, restaurants and food

- service restaurants, drug stores, barber shops, beauty parlors, travel agencies, hotel/motel accommodations; office supply and/or quick print and copy establishments, and like uses), provided that such related support uses are physically located inside the structures devoted to the permitted uses set forth above, and accessory structures and uses customarily incidental to such permitted uses.
- b. Conditional Uses. Those conditional uses allowed by PR-2, except detached single-family dwellings; helistops, and other uses not listed in this §6.9.5.3 as may be approved by the Council following recommendation by the Commission.
- c. Maximum Building Height. Unless approved as a conditional use:
- (1) When a building is to be constructed within three hundred (300) feet of a single-family residential dwelling in a PR-1 land use district existing at the time of the issuance of a building permit for said building, said building shall not exceed three (3) stories in height.
 - (2) When a building is to be constructed more than three hundred (300) feet but less than five hundred (500) feet from a single-family residential dwelling in a PR-1 land use district existing at the time of the issuance of a building permit for said building, said building shall not exceed six (6) stories in height.
 - (3) No building shall exceed ten (10) stories in height.

In the event a building is destroyed by fire or other casualty, such building may be rebuilt or reconstructed up to its original height without regard to the distance between such building and any single-family residential

dwelling built after the commencement of the initial construction of such building.

All buildings shall conform to the City Building Code, Fire Code and Fire Prevention Code as adopted by the City.

4. Planned Neighborhood Commercial (PNC).
- a. Permitted Uses. Those permitted uses allowed by PO; those permitted uses and conditional uses allowed by PR-2; retail establishments consistent with a neighborhood environment, including, but not limited to barber or beauty shops; restaurants; private clubs; drug stores; laundry and dry cleaning pick up stations and plants using non-flammable solvents only, if otherwise free of obnoxious fumes, odors and smoke; grocery stores; convenience stores; automotive gasoline service stations; florist shops; bakeries; child and/or adult day-care or nurseries; neighborhood service facilities; copy centers; travel agencies; car rental agencies; and with accessory structures and uses customarily incidental to such permitted uses.
 - b. Conditional Uses. Those permitted uses allowed by PR-2; helistops; amphitheaters; in-door motion picture theaters and/or auditoriums; and such other uses not listed in this §6.9.5.4 as may be approved by the Council following recommendation by the Commission.

5. Planned Business (PB).

- a. Permitted Uses. Those permitted uses allowed by PR-1 and PNC; schools; retail establishments, including but not limited to, shopping centers; veterinary clinics (no outside kennels); auto dealerships; auto parts stores; building material sales; department stores; radio and TV stations; domestic equipment rental, furniture stores; motels or hotels; in-door motion picture theatres and/or auditoriums; hospitals; automotive gasoline service establishments which may also serve auto functions such as muffler, tire, battery, brake and transmission shops; establishments for the design and distribution of printed material, coin-operated laundromats; car washes; card/gift shops; cosmetic studios; craft or hobby shops; dance studios; photographic studios; duplicating or copying service; health food stores; interior decorating stores; opticians, medical clinics; shoe repair, audio video; tanning salons; assisted living care facilities; hardware stores; jewelry stores; sporting goods stores; sales showrooms for appliances, furniture, carpet, lighting fixtures, medical and office equipment; toy stores; indoor sports facilities (bowling, health club or spa, racquet club, skating rink); and factory outlet stores, and accessory structures and uses customarily incidental to such permitted uses.
- b. Conditional Uses. Those conditional uses allowed by PNC; commercial recreation and amusement facilities; self-service storage facilities; telecommunications facilities; and other uses not listed in this §6.9.5.5 as may be approved by the Council following recommendation by the Commission.

6. Planned Light Industrial (PI).

- a. Permitted Uses. Those permitted uses allowed by PB; major auto repair or renovation facilities not housed in the same structure or accessory structure to an auto sales establishment; bottling plants; construction yards; distribution yards for gasoline and fuel or tanks; domestic animal kennels; farm machinery and farm supply sales; heavy equipment sales and service; highway maintenance yards and buildings; janitorial and maintenance service; laundry and dry cleaning plants; printing establishments; light industrial, fabricating, processing, assembling and manufacturing uses; sanitary sewage and/or waste water treatment facilities; research and development laboratory facilities; warehouses; water or liquid storage tanks; wood working shops; and self-service storage facilities and accessory structures and uses customarily incidental to such permitted uses.
 - b. Conditional Uses. Those conditional uses allowed by PB, except multi-family; live entertainment; telecommunications facilities; and other uses not listed in this §6.9.5.6, all as may be approved by the Council following recommendation by the Commission.
- 6.9.6. Requirements for Accessory Structures, Fences, Signs, Off-street Parking, Loading Areas, Landscaping, and Buffer Strips
- It is intended that the development criteria submitted with the application for the PUD will set forth requirements for accessory structures, fences, landscaping, buffer strips, signs, off-street parking, and loading areas. If the application does not contain such information, then the provisions of [§4.4](#) Accessory Structures,

§4.5 Fences, [Article 8](#) Parking Regulations, [Article 9](#) Landscaping and [Article 11](#) Sign Regulations shall apply, but not otherwise.

6.9.7. Mixed Use.

It is intended that the flexibility of the PUD will allow in appropriate circumstances mixed uses on any particular parcel within the PUD, taking into consideration the compatibility of the intended uses with the surrounding use(s). "Mixed use," as used herein, shall be defined as a combination of permitted use(s) and conditional use(s) for more than one land use district and shall be considered as a "conditional use" under each land use district.

6.9.8. Building Permit

1. General. The developer of the PUD shall proceed with the development of the property in accordance with the Plan and no further approvals shall be required except as set forth in this §6.9.8. If plans are submitted for the construction of improvements on any particular parcel within the PUD, a Building Permit shall be approved or disapproved according to the procedure set forth in this §6.9.8.
2. Issuance of Building Permits for Permitted Uses. Upon application for a Building Permit for the construction of improvements on any parcel within the PUD, if the Zoning Official shall determine that the intended use of the improvements is a "permitted use" within the applicable land use district of the PUD, then a Building Permit shall be issued in accordance with the provisions of [Article 13](#).
3. Other Uses. Upon application for a building permit for the construction of improvements on any parcel within the PUD, if the Zoning Official shall determine that the intended use of the

improvements is a "conditional use" or "mixed use" within the applicable land use district of the PUD, the Zoning Official shall defer said applicant and application to the Commission for application review in accordance with §6.9.8.4 below.

4. Conditional uses. Requests for conditional uses as stipulated within the land use district regulations of the PUD are permitted only after review and a recommendation for approval, denial or other report by the Commission and approval by the City Council, in accordance with [§13.3](#), subject to the following procedure:
 - a. The applicant shall submit to the Commission a site development plan which shall include:
 - (1) Existing and proposed topography;
 - (2) Property lines;
 - (3) Scale;
 - (4) Storm drainage facilities and other utility easements;
 - (5) Existing and proposed structures and their uses;
 - (6) Schematic exterior lighting;
 - (7) General landscaping and fences;
 - (8) Location of outside storage areas;
 - (9) Location of parking and loading areas;
 - (10) Points of ingress and egress; and
 - (11) Signs, unless the protective covenants for the PUD establishes an architectural review committee or other entity that is responsible for, among other things, review and approval of signage.
 - b. Any review and/or determination made by the Commission pursuant to this §6.9.8.4 shall be governed by, and performed in accordance with [§13.3](#) of the Zoning Ordinance.

5. Subdivision plats and roads. Nothing in this §6.9.8 shall be construed to require a Building Permit for approval of subdivision plats or road designs or the construction of roads within the PUD.

6.9.9. Deviation from the Plan.

1. Incidental Change. To facilitate insignificant adjustments of the approved Plan as may be required by engineering or other circumstances unforeseen at the time of zoning approval, Zoning Official and City Engineer, as applicable or appropriate under the circumstances, may approve alterations to the plan which are considered incidental in scope, which approval shall be in writing. Approval of plans by official rubber stamp, initials and/or signature of the appropriate official shall be deemed approval “in writing”.

2. Minor Change. Changes to the plan, which are minor but more significant in scope than an incidental change, are subject to the review, approval and authorization of the Commission through the typical plat approval process. “Minor changes” shall be defined as increases in density, reductions in open space, and land use district boundary changes, provided no such minor change exceeds 5% of the original specification for such respective matter under the plan.

3. Major Change. A “major change” in the plan shall be defined as any increase in density, reduction in open space, or land use district boundary change, in excess of 5% of the original specification for such respective matter under the plan. (NOTE: Such 5% is a cumulative total, which includes all requests since the plan was approved by the Council).

4. Approval of Major Changes. Whenever the developer of a PUD shall request a major change as defined in §6.9.9.3, the

developer shall file an application for change, which shall be reviewed in accordance with the provision of §6.9.2 of the Zoning Ordinance.

5. Approval of Plat Changes. Once any plat has been approved by the Commission, any changes to such approved plat will be subject to review and approval by the Commission through the typical process for such changes. Any approved changes to a plat will not constitute a change to the Plan.

6.9.10. Time Limit for Development of Plan.

If no construction has begun within twelve (12) months from the estimated and approved start up date of the PUD, as indicated by §6.9.2.4.d. above, said approval shall lapse and be of no further effect. The Commission, upon showing of good cause by the developer, may extend for period(s) of six (6) months for the beginning of construction and development shall commence each year on the lesser of ten (10) percent of the total PUD or twenty (20) acres (whichever is less) and said construction should continue and be completed within a reasonable time.

6.9.11. Definitions.

1. Intent. For purposes of this §6.9, certain terms used herein are herewith defined, and if any terms defined herewith in this §6.9.11 shall contradict or conflict with any terms defined in any other section of this Zoning Ordinance, those terms as defined in this §6.9.11 shall control.

2. Definitions.

a. *Attached single-family dwelling* shall refer to those buildings so designed and arranged to provide separate sleeping, cooking, and kitchen accommodations and toilet facilities for occupancy of two (2) families or

- more whereby the living units are built for sale, in fee simple, and not for lease and including condominiums and townhouses.
- b. *Cluster residential* shall refer to detached single-family residential dwellings, typified by a building separation of a minimum of ten (10) feet or as allowable by applicable fire code.
 - c. *Detached single-family dwelling* shall refer to a detached building so designed and arranged to provide sleeping, cooking, and kitchen accommodations and toilet facilities for occupancy by one family only.
 - d. *Interim use* shall refer to any temporary use of land in any area of a PUD, which has been approved as a part of the Master Development Plan and criteria. An interim use can be any use and may or may not be a permitted use or a conditional use of the land use district in which it is located.
 - e. *Multi-family dwellings* shall refer to a structure designed or used for residential occupancy by more than two (2) families, with or without common or separate kitchen facilities or dining facilities, and which is leased in part or whole, including apartment houses, apartment hotels, rooming houses, boarding houses, fraternities, sororities, dormitories, or similar housing types, but not including hotels, motels, hospitals, or nursing homes.
 - f. *Open space* shall refer to any greenbelt, buffer, park, lake, river, or recreational development or area which is owned by or dedicated to the public, or owned in common or private, devoid of any habitable buildings, except where accessory to the provision of recreation opportunities, landscaping, drainage, spray irrigation or soil conservation, including, without limitation, conservation or green space easements, parks, such open spaces as may be located within a school site, golf courses, and such spaces as may be restricted to homeowner or business association membership. NOTE: No more than twenty-five (25) percent of the open space specified in the approved Plan shall be included in building setbacks. Furthermore, no areas may be included as part of the open space specified in the approved Plan unless such area is a contiguous area of at least 1,000 square feet, which exceeds 15 feet in width at its narrowest point.
 - g. *Plat* shall refer to any drawing or drawings and related written material indicating the manner or layout of a road, parcel, and/or subdivision to be submitted to the City for approvals and/or recording purposes.
 - h. *Story* shall refer to any portion of a building that is (1) constructed wholly above ground and (2) included between the surface of any floor and the surface of the floor next above it, or, if there is no floor next above it, then the space between the floor and the ceiling next above it. Attic space shall not be included as a story.
- 6.9.12. Changes to Zoning Ordinance
- No amendment or modification of this Zoning Ordinance shall be effective as to any PUD approval issued prior to such amendment or modification, it being intended that the PUD shall continue to be developed in accordance with the Zoning Ordinance in effect at the time of such prior approval without specific approval of the governing body in ratification of an amendment.

§6.10. MXD Planned Community Mixed Use District

6.10.1. Intent. The MXD District is intended to direct and encourage development of mixed uses in a pedestrian and/or transit-supportive pattern in locations indicated as “Village Centers” in the Comprehensive Plan. An MXD District may also coincide with an area surrounding a transit station or within designated centers along a transit line as designated in the Comprehensive Plan. Also considered shall be the use of the land and its improvements with adjacent land and the benefits or detriments to the property, adjacent land and to the City, which would result from the development in accordance with the proposed plan; thus promoting the public health, safety and welfare.

Furthermore the MXD District is intended to encourage redevelopment and infill development laid out, developed and used according to a Master Development Plan to improve mobility by providing pedestrian and transit-friendly development with a mix of residential, commercial and employment opportunities in accord with the following:

1. Encourage investment in areas so designated by the Comprehensive Plan while adding to the quality of life in neighborhoods;
2. Encourage safe, attractive and convenient access for transit users, pedestrians and bicyclists through appropriate design;
3. Allow densities supportive of mixed use development;
4. Reduce vehicular trip generation by allowing for combining of trips and locating destinations within walking and biking distances of neighborhoods and transit stops;

5. Reduce congestion and increase safety on major roadways by providing from local streets, shared drives and alleys;
6. Reduce conflicts between pedestrians, bicycles and vehicles;
7. Reinforce the use of public transit by locating employment-oriented business and higher density residential uses, adjacent to transit stops.

6.10.2. Area Requirements. Except when the Master Development Plan of an existing approved MXD is amended to include additional area, any tract of land to be zoned MXD shall have a minimum of two (2) acres.

6.10.3. Review Procedure.

1. Prior to submission of the Master Development Plan, the applicant shall submit and review a conceptual plan with City Planning Staff for a preliminary indication of the consistency of the plan with the basic intents and requirements of the District. The applicant shall then prepare and submit the required materials of the Master Development Plan to the City Clerk.
2. Applications shall be submitted a minimum of twenty-five (25) working days prior to the next regularly scheduled Commission meeting.
3. Rezoning to an MXD District shall proceed as provided in [§13.4 Amendments](#) and as described herein.
4. Council approval of the application for the MXD shall be an approval of (a) the Master Development Plan and (b) the planning criteria of the application (collectively, the “Plan”). The developer may proceed with the development in accordance with the Plan, and no further approvals shall be required except for Building Permits, subject to [§13.2](#).

6.10.4. Application. The application shall contain the following:

1. An application fee to defray the cost of processing the application, as set from time to time by the Council. Applicant shall be responsible for all costs of notification and advertisement incurred.
2. A list of property owners. Any material change in the owners of the property shall be submitted to the City Clerk within sixty (60) days after such change.
3. A Master Development Plan and any maps necessary to show the following information:
 - a. A legal description;
 - b. North arrow and scale
 - c. Planning objectives to be achieved.
The statement should include a description of the character of the proposed development and the rationale behind the assumptions made by the applicant in relation to the overall community growth;
 - d. Topography (in no greater than two (2) foot contour intervals), waterways, flood plains, wetlands, forest cover and known areas of subsurface mining or environmental hazards;
 - e. A general description of the surrounding area, including current zoning and/or land uses,
 - f. Existing and proposed streets, greenbelts, buffers, open spaces, schools, parks and community service areas within and adjacent to the project area
 - g. A description of how any phases or staging will proceed and an estimated date when the development will begin;
 - h. The gross floor area of non-residential uses, area of proposed open spaces, and the number and gross density

(including streets and open spaces) of all dwelling units;

- i. Development criteria, in accordance with §6.10.8 through §6.10.10, including but not limited to: setbacks and build-to lines, building heights, street and sidewalk design, signage, off-street parking, lighting, and/or any other development criteria which the applicant may propose;
- j. The location of proposed structures and uses;
- k. Landscape design criteria and plans for open space;
 - l. Availability of transportation, water supply, storm sewer and sewage disposal;
- m. Plans for the ownership and maintenance of common areas;
- n. Documentation of any protective and/or restrictive covenants, property owner associations and architectural review committees, if any, and a discussion of their functions;
- o. A traffic study, if required by the City Engineer;
- p. Any proposed modification of the subdivision regulations.

6.10.5. Other Regulations Not Applicable.

Where the provisions of this Section are in conflict with other provisions of this Ordinance, the provisions of this Section shall take precedence.

It is the intent of this Section that the application shall set forth criteria applicable to the property and that flexibility shall be allowed in the construction of improvements thereon. Accordingly, for the purposes of this district, the strict conformity to provisions of [Articles 4, 7, 8](#) and [9](#), shall not apply, except as otherwise stated herein. The applicability of the City Subdivision Regulations shall be subject

to any modifications accepted by the Commission.

6.10.6. Deviation from the Plan.

- 1. Incidental Change. The Zoning Official, Building Official and City Engineer, as applicable, may approve alterations to the plan that are considered incidental in scope, which acceptance shall be in writing. Acceptance of plans by official stamp or seal, initials and/or signature of the appropriate official shall be deemed acceptance “in writing”.
- 2. Minor Change. Changes that are minor but more significant in scope than an incidental change are subject to review, acceptance by the Commission through the typical plat acceptance process. “Minor changes” include increases in density, reductions in open space, and changes to the accepted proportion of mixed uses, provided no such minor change exceeds five (5) percent of the original specification under the Plan.
- 3. Major Change. A “major change” includes any increase in density, reduction in open space, or change to the accepted proportion of mixed uses over five (5) percent of the original specification for such respective matter. (NOTE: Such percentage is cumulative, which includes all requests since final acceptance). The developer shall file an application for any major change, which shall be reviewed in accordance with the provision of §6.10.3.
- 4. Acceptance of Plat Changes. Once the Commission has accepted any plat, any changes shall require acceptance by the Commission through the typical process for such changes. Any accepted changes to a plat will not constitute a change to the plan.

6.10.7. Time Limit for Development of Plan. If no construction has begun within twelve

(12) months from the start up date, as accepted in the Plan, said acceptance shall lapse and be of no further effect. The Commission, upon showing of good cause by the developer, may extend for period(s) of six (6) months for the beginning of construction, the intent being that construction should be completed within a reasonable time.

6.10.8. Uses. It is intended that flexibility be provided to allow mixed uses within the development, taking into consideration compatibility with surrounding use(s). Therefore, the development shall contain and provide an appropriate mix of complementary uses, which shall include those that offer goods and services at different times of day and those in which people may choose to live, work, shop and play in close proximity to one another.

- 1. Prohibited uses. Uses or structures prohibited shall be the following, including uses and structures deemed by the Commission to be substantially similar in use and impact to those listed following:
 - a. Drive-through facilities, except those located to the rear or interior of the development.
 - b. Sales, service and rental of commercial equipment and construction materials.
 - c. Vehicle sales, service and rental, except in an enclosed structure.
 - d. Distribution, storage and warehousing facilities.
 - e. Heavy commercial services.
 - f. General manufacturing and other industrial uses.
 - g. Salvage, recycling and outdoor storage.
 - h. Towing services.

- i. Wholesale trade.
2. Notwithstanding provisions to the contrary that may be found elsewhere in this Ordinance:
 - a. Uses prohibited in a mixed use development that were lawfully in existence at the time of district designation but that are to remain as a part of the overall Plan, shall not be expanded, because such uses are not considered to be compatible with the intent of the district.
 - b. All other uses and structures that were lawfully in existence at the time of district designation may be expanded, upon findings by the Commission that the proposed expansion complies with the intents of the MXD District and the Plan. Total such expansion shall be limited to a maximum of twenty (20) percent of the gross floor area present at the time of district designation, and only upon acceptance by the Commission of a Plan that commits the applicant, through covenant or other appropriate means, to development that will achieve, through phases if necessary, full compliance with all applicable standards of the district.
- 6.10.9. Parking Requirements. It is intended that the provision of shared and on-street parking, mixed uses and optimized pedestrian access allows reductions in parking requirements as provided in [§8.1.2](#).
 1. Parking shall not exceed 120% of the cumulative spaces required by [§8.1.2](#) unless such additional parking is provided in a parking structure.
 2. Only new on-street parking, created as a result of the development, may be counted toward the parking requirement.
3. Surface parking lots shall be landscaped in accordance with the applicable requirements of [§9.2 Site Landscaping](#).
4. Vehicular access to parking and loading areas shall be limited to mid-block alleys and shared driveways.
- 6.10.10. Review Criteria and Standards. The Commission shall employ the following checklist during the review process.
 1. Uses.
 - a. A project shall include a residential component in combination with one or more of the following: commercial, lodging, institutional or recreational uses. The ratio of mixed uses shall be acceptable to the Commission.
 - b. A variety of uses shall be placed close together to optimize pedestrian convenience.
 - c. Buildings may include more than one use. However, residential uses may not be located on the same floor of the same building as a different use.
 - d. Residential uses shall not exceed a net density of ten (10) dwelling units per acre.
 2. Site Planning. Site plans should establish legible circulation paths, human-scaled public spaces and clear transitions between public and private space through the location of buildings, parking areas, access points, and walkways.
 - a. Blocks larger than 400 feet x 400 feet should be avoided within the center of a mixed use development. Blocks may be larger along the periphery to provide an appropriate transition to surrounding neighborhoods.
 3. Building Height.
 - a. The maximum building height, for lots adjacent to any single-family residential district, shall be three (3)

- stories or forty-eight (48) feet, whichever is less.
- b. The maximum building height for all other cases shall be five (5) stories or sixty (60) feet, whichever is less.
4. Streetscape Design.
- a. All streets shall be designed to promote connectivity while calming traffic.
 - b. New streets may include on-street parking as approved by the City Engineer.
 - c. Sidewalks shall be installed along all street frontages as needed, and shall:
 - (1) Be completely interconnected within the site and from the site to adjacent public sidewalks;
 - (2) Be at least five (5) feet wide in primarily residential areas;
 - (3) Be at least eight (8) feet wide in primarily commercial areas; and
 - (4) Be separated from the street by a vertical curb.
 - d. A tree lawn, regularly spaced tree wells, planter boxes, and/or on-street parking shall be provided as a buffer between the roadway and sidewalk.
 - e. Planting strips and street trees shall be provided as required in the City Public Works Manual.
5. Building Design. Buildings shall be oriented to maximize the building frontage along the street. Building frontage may be less and a modest setback incorporated where necessary to provide an appropriate transition to adjacent neighborhoods.
- a. Mixed-use buildings with street level commercial space shall be set back no more than five (5) feet from the sidewalk unless the proposed setback is to be a courtyard, plaza or similar public space.
 - b. Any residential units located within fifteen (15) feet of a public sidewalk shall be raised at least two (2) feet above the grade level of the sidewalk.
 - c. Buildings shall provide and maintain a public entrance along the street. Buildings shall be oriented toward the pedestrian by providing a direct link between the building and the existing and/or proposed pedestrian system.
 - d. Shading and protection from inclement weather, through awnings or canopies, shall be provided over public sidewalks to optimize pedestrian comfort.
 - e. Building service areas should be placed away from street view.
6. Open Space.
- a. In primarily non-residential areas at least fifteen (15) percent of the total site area shall be dedicated to open space. Where feasible, this should be fulfilled with a plaza, courtyard or similar public space in a central location adjacent to multiple buildings on the site.
 - b. In primarily residential areas at least twenty (20) percent of the total site area shall be dedicated to usable open space.
7. Vehicle and Bicycle Parking.
- a. Parking should be placed away from street view, to the rear or side of buildings and never at corners.
 - b. Parking areas within a block should be shared. Reserved spaces shall be excluded from shared parking reductions per [§8.1.2](#).
 - c. Parking facilities shall be designed with connections to the sidewalk system and through-pedestrian paths, clearly identifiable through changes in material or elevation.

- d. Along street frontages, parking structures should contain ground-level business uses.
 - e. Bicycle parking facilities should be provided as follows:
 - (1) Multi-family: 1 space per dwelling
 - (2) Retail: 1 space per 2000 sq. ft. GLA
 - (3) Office: 1.0 space per 4,000 sq. ft. GLA
 - (4) Park and Ride Facilities: 10 spaces per acre
8. Lighting. Lighting should be carefully integrated with building, landscape and streetscape design. Scale, intensity, and fixture design should vary between areas of different densities and uses. Lighting should increase pedestrian comfort and safety. Well-lit streetscapes provide a sense of security and encourage nighttime activity. Ornamental light posts and fixtures help to create an attractive streetscape and should be consistent with the architectural character of the area.
- Light fixtures should be shielded to keep light focused downward and avoid glare and excess lighting.
- a. Lighting may be used to showcase building and landscape features, emphasize important spaces and promote nighttime vitality and safety. All light sources should be shielded to eliminate nighttime glare. Building-mounted lights may be used in place of light posts to safely illuminate pedestrian and minor vehicular ways.
 - b. Streetscape lighting should be compatible with the scale and character of surrounding buildings and open spaces. A larger number of lower scale, low-intensity lights is preferred to fewer, taller high-intensity lights. In the center of mixed use developments, light posts should be eight (8) to twelve (12) feet in height along sidewalks and spaced no more than thirty (30) feet apart. For natural quality, lighting elements should provide full-spectrum light to prevent color distortion. Ornamental fixtures are recommended.
- c. Roadway lighting should be designed to enhance the safety of vehicular and pedestrian flows. Light posts may be located at both edges of the roadway or within a landscaped median. Lighting should be concentrated at intersection crosswalks for pedestrian safety. Roadway lighting should not adversely affect the streetscape lighting.
9. Stormwater management. Off-site treatment (including curb and gutter, conduits, catch basins, and related appurtenances) shall be the preferable management technique; however, where such technique is inadequate or impractical, it should be combined or substituted with on-site retention and/or detention facilities integrated into the open space and landscape design of the site.
10. Transit. Development sites that include an existing or planned transit stop shall:
- a. Be directly served by a sidewalk.
 - b. Include a concrete loading pad from sidewalk to curb.
 - c. Include a transit shelter integrated with the development.
 - d. Provide bicycle parking as accepted by the Commission.
 - e. Include bus turnout lanes along the transit route.
 - f. Provide park-and-ride facilities (if in area designated by the MPO as a park-and-ride service area)

Table 6 Use Regulations for Non-Residential Districts								
USES / DISTRICTS:	A	B-1	B-1.2	B-2	B-3	O-1	O-2	INST
AGRICULTURAL								
Farm, Raising of Crops only	Y							
Farm, Raising of Livestock	L							
Farm Support Business	SE				C			
Forestry	Y							
Stable	Y							
RESIDENTIAL								
Assisted Living Facility			C					Y
Independent Living Facility			Y					
Multi-family dwelling			Y					
Townhouse			Y					
LODGING								
Bed and Breakfast, §7.4	C							
Hotel				Y	Y			
Motel					Y			
INSTITUTIONAL								
Animal Shelter, §7.6	Y			C	C			C
Private Club		Y	Y	Y	Y	Y	Y	Y
Day Care Center, §7.7		L	L	Y	Y	C	C	C
Hospital					C		C	Y
Nursing Home					C			Y
Place of Assembly	C	L	L	Y	Y	L	Y	Y
Public Facility	L	L	L	Y	Y	L	Y	Y
Public Utility Facility	SE	SE	SE	SE	SE	SE	SE	SE
School, Commercial	C	L	L	Y	Y	L	Y	Y
School, Not-for-Profit	C	L	L	Y	Y	L	Y	Y
School, Public	C	L	L	Y	Y	L	Y	Y
BUSINESS								
Automotive Repair Service, Major				C	C			
Automotive Repair Service, Minor				Y	Y			
Automotive Sales				C	C			
Bank or Financial Service		L	L	Y	Y	Y	Y	
Broadcast Studio				Y	Y	Y	Y	
Business or Professional Office		L	L	Y	Y	Y	Y	
Business Support Service		L	L	Y	Y	Y	Y	
Car Wash, Freestanding (non-accessory)				C	C			
Convenience Store		Y	Y	Y	Y			
Entertainment, Indoor				Y	Y			
Entertainment, Outdoor			C	C	C			
Funeral Home				C	Y			
Garden Center/ Nursery		L	L	Y	Y			
<p>Y – The use is permitted by right. L – Permitted to limits set by district regulations SE – Special Exception Use, requires approval by BZA (see §12.3). May also be subject to district limitations. C – Conditional Use, requires approval by the Council (see §13.3). May also be subject to district limitations. A use not listed may be requested for approval as a Conditional Use per §13.3. A use followed by a numeric cross-reference is subject to Use-Specific Regulations in Article 7. A blank cell indicates that the use is not permitted.</p>								

Table 6 Use Regulations for Non-Residential Districts								
USES / DISTRICTS:	A	B-1	B-1.2	B-2	B-3	O-1	O-2	INST
Gas Station, §7.2			C	Y	Y			
Hardware Store		L	L	Y	Y			
Home Improvement Center				Y	Y			
Kennel, §7.6	Y				C			
Laundromat			Y	Y	Y			
Laundry and Dry Cleaning, Retail		Y	Y	Y	Y	Y	Y	
Laundry, Industrial				C	C			
Liquor Lounge		C	C	C	C			
Maintenance Service				C	C			
Medical Clinic			L	Y	Y	Y	Y	Y
Medical Support Service			L	Y	Y	Y	Y	Y
Personal Service		L	L	Y	Y			
Produce Market	Y	Y	Y	Y	Y			
Restaurant, Fast Food		L	L	Y	Y			
Restaurant, Standard		L	L	Y	Y			
Retail, General, Enclosed				Y	Y			
Retail, General, Unenclosed				C	Y			
Retail, Neighborhood		L	L	L	L			
Services, Neighborhood		L	L	L	L			
Service Station, §7.2			C	Y	Y			
Studio, Artist		Y	Y	Y	Y			
Veterinary Hospital, §7.6				C	C			
OTHER								
Airport					C			
Cemetery	C							C
Construction Service					C			
Country Club	C							
Heliport					C		C	C
Landfill					C			
Manufacturing, Light					C			
Mixed Use, General			L					
Mixed Use, Live-Work			L					
Parks, Gardens, Playgrounds	Y	Y	Y	Y	Y			Y
Recreation, Indoor				Y	Y			
Recreation, Outdoor				C	C			Y
Rehabilitation Facility					C			Y
Research Laboratory					C		C	
Salvage Yard					C		C	
Storage, Mini-warehouse, §7.5				C	C			
Storage, Outdoor					C			
Telecommunications Facilities, §7.9	C	C	C	C	C	C	C	C
Warehousing, Wholesale, Distribution				C	C			

Y – The use is permitted by right.
L – Permitted to limits set by district regulations
SE – Special Exception Use, requires approval by BZA (see [§12.3](#)). May also be subject to district limitations.
C – Conditional Use, requires approval by the Council (see [§13.3](#)). May also be subject to district limitations.
 A use not listed may be requested for approval as a Conditional Use per [§13.3](#).
 A use followed by a numeric cross-reference is subject to Use-Specific Regulations in Article 7.
 A blank cell indicates that the use is not permitted.

Article 7 USE-SPECIFIC REGULATIONS

§7.1. Home Occupations

Home occupations are permitted uses in any estate or residential zoning classification under the following limitations. For home occupations in a planned unit development, refer to [§6.9.5.1](#).

7.1.1. Limitations

1. Home occupations shall be conducted only in the principal dwelling. No more than twenty-five (25) percent, up to 500 sq. ft., of the dwelling may be used for a home occupation.
 2. There shall be no outdoor display or storage associated with the home occupation and no commodities shall be sold on the premises other than by phone, mail or internet. No goods shall be delivered to a purchaser on the premises.
 3. No sign may be attached to the dwelling or any part of the real estate advertising any home occupation.
 4. No home occupation shall be permitted if it creates noise, odors, vibrations or traffic congestion, which interferes with the residential qualities of the neighborhood insofar as health, safety, morals, convenience and general welfare are concerned.
 5. In order to be a permitted home occupation, the use must be one which is habitually, customarily, and commonly established as a reasonable incidental, accessory, subordinate and secondary use. The existing dwelling shall not be enlarged to accommodate the home occupation; nor shall any accessory structure be built for the purpose of operating the home occupation.
 6. No home occupation shall be permitted that requires the operation or keeping on premises of a commercial vehicle.
7. No persons other than members of the family residing on the premises shall be employed by the home occupation.
 8. Home occupations shall be limited to the hours between 7:00 a.m. and 10:00 p.m.
- 7.1.2. Provided full conformance with the above limitations, the types of home occupations that may be permitted shall include, but not be limited to, the following:
1. Offices provided no customers or clients shall be allowed on premises
 2. Phone, mail order and similar sales provided no inventory is stored on the premises and no goods are delivered on the premises by the home owner to any customers.
 3. Music and art lessons, provided there shall be no more than two students receiving instruction at any one time and no students shall be received after 7:00 p.m.
 4. Instruction by a private tutor who offers academic instruction in the several branches of study required to be taught in the public schools of the State of Alabama provided there are no more than five (5) individuals participating in the tutorial instruction at any one time. When complying with this limitation, the home occupation shall not be considered an “Educational Group E” or “Educational Occupancy” for the purposes of the City Building and Fire Codes or City Life Safety Code, respectively. The requirement of “no more than five (5) individuals participating in the tutorial instruction at any one time” shall not mean or include parents that reside in the home or their children, stepchildren or wards.
 5. Crafts, dress making, sewing, tailoring and similar occupations with limited

equipment and provided no clients or customers shall be allowed on premises.

The Board of Zoning Adjustment may approve other home occupations per [§12.3 Special Exceptions](#) so long as they present no greater impact on the neighborhood than those listed above and provided conditions required by the BZA will be met to limit noise, traffic or other impacts that might otherwise disrupt the residential character of the neighborhood.

§7.2. Gas and Service Stations

7.2.1. Use Limitations

1. The following uses shall be prohibited: painting, body work, major repair, dismantling for recovery of parts, and sales or rental of motor vehicles or trailers.
2. Service stations shall not include more than three (3) service bays.

7.2.2. Area and Dimensional Regulations

1. All oil drainage pits and hydraulic lifts shall be located within an enclosed Structure and shall be located no closer than fifty (50) feet to an abutting residential lot line and no closer than twenty-five (25) feet to any other lot line.
2. All permitted mechanical repair work shall be conducted within an enclosed structure and shall be located no closer than fifty (50) feet to any abutting residential lot line and no closer than twenty-five (25) feet to any other lot line.
3. Fuel pumps, pump islands and other service facilities may occupy required yards; however, such shall be set back at least fifteen (15) feet from any lot line. Canopies shall not extend closer than five (5) feet to any lot line.

- 7.2.3. No storage of vehicles shall be permitted for periods in excess of thirty (30) days. Vehicles shall not be permitted to remain

on the property longer than forty-eight (48) hours unless such vehicles are stored within an enclosed building or within a rear or side yard screened in accordance with [§9.4 Screening](#).

§7.3. Conservation Subdivisions

7.3.1. Intent

1. To provide the flexibility to achieve the most effective development on lands that are constrained by natural hazards, environmentally sensitive areas or environmental regulations, which may limit the amount or type of development on such properties;
2. To enhance quality of life by promoting the creation of accessible greenspace throughout the community;
3. To protect sensitive, environmental land features to protect the health and safety of residents and neighboring property owners;
4. To reduce erosion and sedimentation by minimizing land disturbance and removal of vegetation;
5. To encourage interaction within the community by allowing clustering of homes and orienting them closer to the street, thereby providing gathering places and encouraging the use of parks as focal points within the community;
6. To encourage street systems that tend to reduce traffic speeds and reliance on main arteries.
7. To promote construction of convenient walking trails, bike paths, and greenways within new developments that are connected to Adjacent neighborhoods and activity centers to increase accessibility for pedestrians and bicyclists; and

8. To reduce perceived density by providing a maximum number of lots with direct access to and views of open space.

7.3.2. Applicability. The Conservation Subdivision option is available as a use by right in any zoning district in which single-family detached dwellings may be permitted. The applicant shall comply with all other provisions of this Ordinance and all other applicable regulations, except those which may be modified as specified within this Section.

7.3.3. Ownership of Development Site. The tract of land to be subdivided and/or developed may be held in single, separate, and multiple ownership. If held in multiple ownership, the site shall be developed according to a single plan with common authority and common maintenance responsibility as approved by the City Attorney.

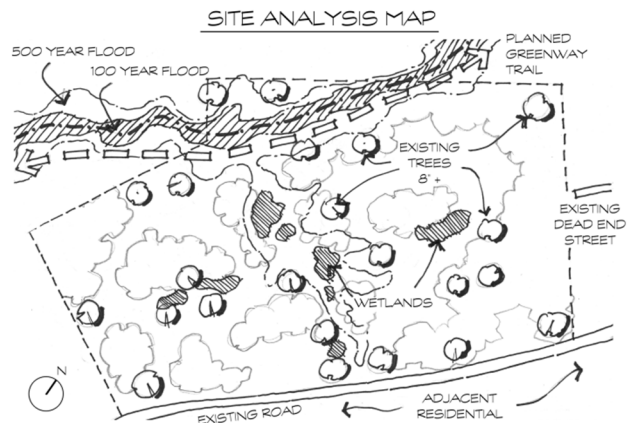
7.3.4. Density Determination. The maximum number of lots shall be determined by the minimum lot size of the Applicable District, the minimum lot size as required by City or County Health Department standards for septic tank use (or similar density limitation where applicable), or the maximum density of the applicable district, whichever is most restrictive. Furthermore, density determination shall also take into account the amount of land necessary for internal streets and other subdivision requirements. In making this calculation, the following shall not be included in the total acreage of the Parcel:

1. Bodies of open water over 5,000 sq. ft. of contiguous area; and
2. Wetlands, as defined by the City or by the Army Corps of Engineers pursuant to Section 404 of the Clean Water Act.

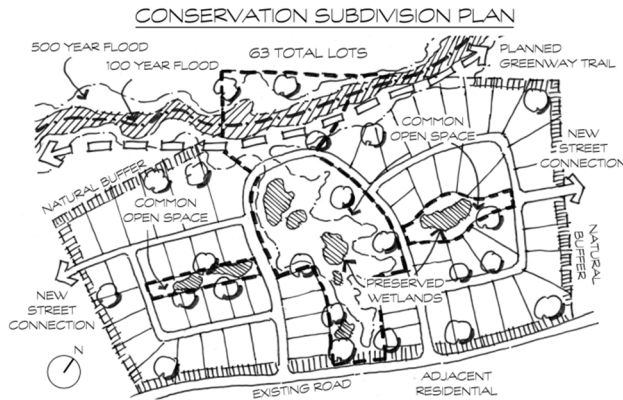
7.3.5. Application Requirements

1. Site Analysis Map Required. Concurrent with the submission of a subdivision plat, the applicant shall prepare and submit a site analysis map. The purpose of the site analysis map is to ensure that important site features have been adequately identified prior to the creation of the site design, and that the proposed open space will meet the requirements of this Section. The site analysis map shall include the following:

- a. Property boundaries;
- b. All streams, rivers, lakes, wetlands, flood hazard boundaries, and other hydrologic features;
- c. All boundaries of applicable regulated buffer areas, easements, and rights-of-way;
- d. Topography at 5-foot or smaller intervals;
- e. All Primary and Secondary Conservation Areas labeled by type, as described in §7.3.6;
- f. General vegetation characteristics;
- g. General soil types;
- h. Planned location of protected Open Space;
- i. Existing roads and structures; and
- j. Potential connections with existing greenspace and trails.



2. Conservation Subdivision Plan. The developer shall prepare a conservation subdivision plan which yields no more lots than identified under §7.3.4. The conservation subdivision plan shall identify open spaces to be protected in accord with §7.3.6 and may include lots which do not meet the size and setback requirements of the applicable district. The Conservation Subdivision Plan shall include an Open Space Management Plan, as described in §7.3.6 and shall be prepared and submitted prior to the issuance of a land disturbance permit.



3. Instrument of Permanent Protection Required. An instrument of permanent protection, such as a conservation easement or permanent restrictive covenant and as described in §7.3.6.5, shall be placed on the open space concurrent with the issuance of a land disturbance permit.
 4. Other Requirements. The applicant shall adhere to all other applicable requirements of the applicable district and the Subdivision Regulations.
- 7.3.6. Open Space Management Plan. For the purposes of conservation subdivisions, open space is defined as the portion of the conservation development or subdivision that has been set aside for permanent protection. Activities within the open space are restricted in perpetuity

through the use of a legal instrument approved by the City Attorney.

1. Standards to Determine Open Space
 - a. The minimum restricted open space shall comprise at least twenty-five (25) percent of the gross tract area.
 - b. The following are considered Primary Conservation Areas and are required to be included within the open space, unless the applicant demonstrates that this provision would constitute an unusual hardship and be counter to the purposes of the Conservation Subdivision:
 - (1) The 100-year floodplain;
 - (2) Riparian zones of at least 75 feet width along perennial and intermittent stream shown on the United States Geological Survey (USGS) quadrangle topographic maps.
 - (3) Slopes above twenty-five (25) percent of at least 10,000 sq. ft. contiguous area;
 - (4) Wetlands determined to be jurisdictional by the Corps pursuant to the Clean Water Act;
 - (5) Existing and planned trails that connect the site to neighboring areas; and
 - (6) Archaeological sites, cemeteries and burial grounds.
 - c. The following are considered Secondary Conservation Areas and should be included within the open space to the maximum extent feasible:
 - (1) Important historic sites
 - (2) Existing healthy, native forests of at least one (1) acre contiguous area;
 - (3) Individual existing healthy trees greater than eight (8) inches caliper; and

- (4) Other significant natural features and scenic viewsheds, particularly those that can be seen from public streets.
 - d. Utility rights-of-way and small areas of impervious surface may be included within the protected open space but cannot be counted towards the twenty-five (25) percent minimum area requirement (exception: historic Structures and existing trails may be counted). Large areas of impervious surface, such as streets and parking lots shall be excluded from the open space.
 - e. At least thirty-three (33) percent of the open space shall be suitable for passive recreational use.
 - f. At least seventy-five (75) percent of the open space shall be in a contiguous tract, which may be divided by a local Street whose area shall be excluded from the open space. The open space shall adjoin any neighboring areas of open space, other protected areas, and non-protected natural areas that would be candidates for inclusion as part of a future area of protected open space.
 - g. The open space shall be directly accessible to the largest practicable number of lots and/or Buildings within the site. Non-abutting lots shall be provided with safe, convenient access to the open space.
2. The following uses shall be permitted within the open space:
- a. Conservation of natural, archeological or historical resources;
 - b. Meadows, woodlands, wetlands, wildlife corridors, game preserves, or similar conservation-oriented areas;
 - c. Boardwalks or walking /bicycle trails constructed of porous paving materials;
 - d. Passive recreation areas, such as open fields;
 - e. Active recreation areas, provided that they are limited to no more than ten (10) percent of the total open space and are not located within Primary Conservation Areas. Active recreation areas may include impervious surfaces. Active recreation areas in excess of this limit must be located outside of the protected open space.
 - f. Landscaped Stormwater Management facilities, community wastewater disposal systems and individual wastewater disposal systems located on soils particularly suited to such uses. Such facilities shall be located outside of Primary Conservation Areas;
 - g. Easements for drainage, access, and underground utility lines;
 - h. Other conservation-oriented uses compatible with the purposes of this Ordinance.
3. The following uses shall be prohibited within the open space:
- a. Golf courses;
 - b. Roads, parking lots and similar impervious surfaces, except as specifically authorized in the previous sections;
 - c. Agricultural and forestry activities not conducted according to accepted best management practices;
 - d. Impoundments; and
 - e. Other activities as determined by the applicant and recorded on the legal instrument providing for permanent protection.
4. Ownership and Management of Open Space. Ownership and maintenance of the common open space and any facilities thereon shall be as provided for

in §4.6 Ownership and Management of Common Open Spaces.

5. Legal Instrument for Protection of Open Space. The open space shall be protected in perpetuity by a binding legal instrument that is recorded with the deed. The instrument for permanent protection shall include clear restrictions on the use of the open space. These restrictions shall include all restrictions contained in this article, as well as any further restrictions the applicant chooses to place on the use of the open space. The instrument shall be one of the following:
 - a. A permanent conservation easement in favor of either:
 - (1) a land trust or similar conservation-oriented non-profit organization with legal authority to accept such easements. The organization shall be bona fide and in perpetual existence and the conveyance instruments shall contain an appropriate provision for retransfer in the event the organization becomes unable to carry out its functions; *or*
 - (2) a governmental entity with an interest in pursuing goals compatible with the purposes of this Ordinance, and if the entity accepting the easement is not the City, then a third right of enforcement favoring the City shall be included in the easement.
 - b. A permanent restrictive covenant for conservation purposes in favor of a governmental entity.
 - c. An equivalent legal tool that provides permanent protection, as approved by the City Attorney.
6. Tax Assessment of Open Space. Once a legal instrument for permanent protection has been placed upon the open space, the applicant may request the County Tax Assessor to reassess the open space at a

lower value to reflect its more limited use.

§7.4. Bed and Breakfast

7.4.1. Use Limitations

1. Bed and Breakfasts are permitted only in detached single-family dwellings. Lodging located in a non-residential building is considered either a “hotel” or “motel” and is not subject to the requirements of this §7.4.
2. The maximum number of allowable guest rooms shall be determined by dividing the gross interior floor area of the principal building (excluding garages) by 500 sq. ft. And, no more than fifty (50) percent of the GFA (excluding garages) of the principal building shall be utilized for guest accommodations. All guest rooms shall be located within the principal building.

7.4.2. Parking. For each approved guest room, there shall be provided one (1) parking space, in addition to those required for the dwelling use. Such additional required parking spaces shall be properly situated on site and screened from adjacent properties. Such parking areas should not detract from the residential character of the neighborhood. Recreational vehicle parking shall be prohibited.

7.4.3. Modifications to Dwelling. Aside from any alterations necessary to ensure the safety of the dwelling, no exterior modifications shall be allowed unless approved by the BZA as a part of the Special Exception approval process. Approved exterior modifications should not detract from the residential character of the dwelling or the neighborhood.

§7.5. Mini-warehouses

- 7.5.1. No storage space shall exceed 400 sq. ft. in area nor be used for other than storage purposes.
- 7.5.2. For single-story facilities all storage units shall open onto a paved driveway with a minimum width of ten (10) feet for each direction of travel or fourteen (14) feet for one-way travel.
- 7.5.3. Outdoor storage of goods and materials, other than vehicles, shall be prohibited. Any types of vehicles, including recreational vehicles, if stored on site, shall be fully screened in accordance with [§9.4 Screening](#).

§7.6. Veterinary Hospitals, Animal Shelters and Kennels

- 7.6.1. No indoor or outdoor pens or runs shall be located within 100 feet of a residential district boundary. Outdoor runs shall be set back no less than fifty (50) ft from all lot lines.
- 7.6.2. Outdoor runs shall be located to the rear of the building and all such areas visible from a public right-of-way shall be enclosed with a wooden privacy fence or similar weather-resistant, durable, and opaque material. Fences (or walls) shall be no less than four (4) ft nor greater than eight (8) ft in height and shall be subject to the applicable regulations of [§9.4 Screening](#).
- 7.6.3. All waste material shall be stored in closed containers and screened as required in [§9.4 Screening](#).
- 7.6.4. Emission of any offensive odors, beyond the lot line, shall not be permitted at any time.

§7.7. Day Care Facilities

Day care facilities, operated within a dwelling, shall comply with the following

requirements and all applicable requirements of [§7.1 Home Occupations](#), as applicable

- 7.7.1. Application of Regulations. The provisions of this Section shall apply to day care facilities providing service for part of a twenty-four (24)-hour day for children under sixteen (16) years of age; for the aged; or for persons who are disabled, by persons giving care (excluding care provided by relatives). Day care facilities shall include family day care homes and day care centers. This Section does not apply to baby-sitting or child day care service furnished in places of worship during worship services.
- 7.7.2. General Provisions. The following general provisions apply to all day care facilities.
 - 1. All day care facilities shall comply with all applicable State regulations.
 - 2. Hours of outside play shall be limited to between the hours of 7:00 a.m. and sunset, as defined by the National Weather Service
 - 3. An outdoor play area shall be provided for child day care facilities in other than the front yard. Play equipment shall be located at least ten (10) feet from an abutting lot line.
 - 4. Fencing, where permitted by this Ordinance, shall be provided to restrict children from hazardous areas and principal arterial and minor arterial roads. Natural or physical barriers may be used as required fencing so long as such barriers functionally restrict children from these areas.
 - 5. The expansion of a family day care home to a day care center shall require rezoning to a district in which a day care center is permitted. When applying for rezoning, the applicant shall submit a

plan showing any existing or proposed outdoor play areas, outdoor play equipment, fencing, access drives, adjacent streets, adjacent hazardous uses, on-site hazards, merchandise delivery areas, on-site sewage disposal facilities, parking spaces, and the drop-off circulation pattern.

7.7.3. Family Day Care Homes. In addition to the other provisions of this Section, family day care homes shall comply with the following:

1. The facility must have a current State registration certificate. Proof of registration renewal must be supplied to the Fire Marshal every two (2) years.
2. There shall be no external evidence of such use. No signs indicating such use may be erected on site.
3. Family day care homes shall be limited to the care of no more than two (2) non-occupant children at any one time.
4. Family day care homes shall only be permitted in detached single-family dwellings.

7.7.4. Day Care Centers. In addition to the other provisions of this Section, day care centers shall comply with the following:

1. A fence with a minimum height of four (4) feet shall physically contain the children within the outdoor play area. Natural or physical barriers may be used in place of fencing so long as such barriers functionally contain children.
2. If the facility fronts on streets of different classifications, access shall be along the thoroughfare of lesser functional classification.
3. All pedestrian pathways shall be adequately lit for safety if utilized during non-daylight hours. Specific areas for lighting are entranceways, pedestrian access to the outdoor play areas,

sidewalks, drop-off areas, merchandise delivery areas, and all parking areas. Such lighting shall not produce objectionable glare on adjacent properties.

7.7.5. Inspections. The Building Official and/or Fire Marshal shall have the right to enter and inspect the dwelling, building and premises for compliance purposes following advance notice to the owner.

§7.8. Accessory Dwellings

7.8.1. Use Limitations.

1. No more than one Accessory Dwelling shall be permitted for each principal dwelling.
2. The gross floor area of the Accessory Dwelling shall not exceed twenty-five (25) percent of that of the principal dwelling. If housed within a structure also containing parking for the principal dwelling, such parking area may be excluded from the calculation. However, if any parking is provided for the Accessory Dwelling, it shall be included in the calculation.

7.8.2. Location and Setbacks. Accessory Dwellings shall be located to the side or rear of the principal dwelling and shall be set back from side and rear lot lines as required of the principal dwelling.

7.8.3. Access. The Accessory Dwelling shall not have access to abutting streets in addition to that permitted for the principal dwelling.

7.8.4. Design Standards. If visible from the public right-of-way, the design of the Accessory Dwelling shall be consistent with that of the principal dwelling, including colors, materials, roof pitch, etc.

§7.9. Telecommunications Facilities

7.9.1. Purpose. The purpose of these standards is to establish minimum considerations and criteria for the review of telecommunications facilities. It is the City of Vestavia Hill’s express intent that the construction of new towers be an option of last resort; to the greatest extent feasible, location of antennae on existing towers and other suitable structures should first be sought. These standards are designed to ensure the compatibility of towers with and avoid adverse impacts to nearby properties and discourage the proliferation of towers throughout the City.

7.9.2. Applicability. All telecommunication facilities are subject to these standards and to statutory review by the Commission and Council in accordance with Section 11-52-11 of the Code of Alabama, 1975, as amended. Anything contained in this Ordinance to the contrary notwithstanding, telecommunications facilities are conditional uses, which require approval by the Council.

7.9.3. Objectives. The proposed locations and design of all telecommunication facilities shall duly consider the following public health, safety and general welfare objectives:

1. Structural Safety. The proposed facility will comply with wind loading and other structural standards contained in applicable building and technical codes so as not to endanger the health and safety of residents, employees or travelers in the event of structural failure of the tower due to extreme weather conditions or other acts of God.
2. View Protection. The proposed facility will be designed to minimize adverse visual impacts to surrounding properties

and the public right-of-way, given the topography of the proposed site and surrounding area.

3. Land Use Compatibility. The proposed facility will be compatible with the surrounding land uses, given the character of the use and development of the location.
 4. Design Harmony. The proposed facility will be designed in harmony with the natural setting and the surrounding development pattern as well as to the highest industry standards.
 5. Existing Communication Services. The proposed facility will comply with FCC and other applicable standards so as not to interfere with existing communication services in the area.
 6. Health Effects. The proposed tower will comply with all applicable federal, state, county and City health standards so as not to cause detrimental health effects to persons in the surrounding area.
- 7.9.4. Development Criteria. The Building Official and City Engineer shall review all applications for telecommunications facilities for compliance with the applicable standards and criteria listed below. These criteria are considered the minimum necessary to protect the public health, safety and general welfare. The Commission may also impose higher standards if it deems them to be necessary to further the objectives of this Section.
1. Co-Location. No new tower shall be established if space is structurally, technically and economically available on an existing tower, which would serve the area that, the new tower would serve. Documentation that reasonable efforts have been made by the applicant to achieve co-location shall be submitted in accordance with §7.9.4.2 below. Towers

shall be designed to maximize shared use to the greatest extent possible, given the structural and technical limitations of the type of tower proposed. In any event, collocation shall be encouraged. If feasible, each tower shall, at a minimum, be designed for double its intended use for all transmitting and receiving antennae other than microwave dish antennae.

2. Removal of Obsolete Towers. Any tower that is no longer in use for its original communications purpose shall be removed at the owners' expense. The owner shall provide the Building Official with a copy of the notice of the FCC of intent to cease operations, which shall be given ninety (90) days from the date of ceasing operations to remove the obsolete tower and accessory structures. In the case of multiple operators sharing use of single tower, this provision shall not become effective until all users cease operations.
3. Setbacks.
 - a. Where permitted, the distance between the base of the tower, including guys, accessory facilities and property lines abutting residential districts, public parks and roads must equal twenty (20) percent of the tower height. Property lines adjacent to other uses (e.g. agricultural, industrial) shall require a setback equal to the rear yard setback established for the underlying zone.
 - b. Notwithstanding Item a above, when located within or adjacent to a residential district or dwelling, the minimum standard setback from all adjoining residential property boundaries shall be fifty (50) feet.
 - c. Site plan review by the Commission may result in reduction of the standard setbacks in exceptional cases where a hardship would result due to unusual

conditions on the site or other impracticalities. However, the Commission shall not reduce the setbacks to the detriment of affected residential properties.

4. Appearance.
 - a. Towers shall be of a monopole type and shall maintain an exterior finish so as to reduce the visibility of the structure, unless other standards are required by the FAA.
 - b. The design of the tower shall be of a type that has the least visual impact on the surrounding area as determined by the Commission.
 - c. The design of the tower compound shall, to the greatest extent possible, maximize use of building materials, colors, textures, screening and landscaping that effectively blend the tower facilities within the surrounding natural setting and built environment.
5. Lighting. Towers shall not be artificially lighted unless required by FAA or other authority for safety purposes. Where required, the Commission shall review the available lighting alternatives to assure that lighting proposed would cause the least disturbance to the surrounding views. "Dual lighting" (red at night/strobe during the day) shall be preferred unless restricted by the FAA. Security lighting may be permitted in accordance with Item e: Security Devices, below.
6. Landscaping.
 - a. A landscaped buffer shall effectively screen the view of the tower compound from adjacent public ways and residential properties.
 - b. The standard buffer shall consist of a minimum eight (8) feet wide landscaped strip outside the dark vinyl coated steel security fencing of the

- perimeter of the compound. The buffer strip shall be planted with an attractive combination of trees, shrubs, vines and/or ground covers that can achieve the full height of the fence at maturity and enhances the outward appearance of the security fence. For sites within 1,000 feet of a residence, site review by the Commission may impose increased buffer standards to include a decay-resistant, solid wood fence, earth berms and brick or masonry walls in addition to the security fencing. All fencing and landscaping shall be maintained by the lessor/owner.
- c. In isolated non-residential areas, alternative landscaping methods may be accepted, such as the use of earth toned colored, vinyl-coated steel security fencing in combination with four feet of evergreen trees, shrubs, vines and/or other plantings.
 - d. In certain locations where the visual impact of the tower would be minimal, such as remote, agricultural or rural locations, or developed heavy industrial areas, the landscaping requirements may be reduced or waived by the Commission.
 - e. Existing mature tree growth and natural landforms on the site shall be preserved to the maximum extent possible. In some cases, such as towers located on large, wooded lots, preservation of substantial natural growth around the property perimeter may be a sufficient buffer.
 - f. Cellular facilities utilizing underground vaults in lieu of above ground switching gear buildings shall be exempted from any buffer requirements.
7. Security Devices. The facility shall be fully secured. A minimum eight (8) feet high, dark vinyl coated steel fence shall be installed around the entire perimeter of the compound (measured to the top of the fence or barbed wired, if applicable). Security fencing shall require screening in accordance with landscaping requirements, as defined above. Other security measures shall include locks and alarms. Approved barbed or razor wire and lighting of the compound shall be permitted, if deemed necessary to fully secure the tower compound.
8. Access. Driveways and onsite parking shall be provided to assure the operator's access to the facility for maintenance or emergency services.
- 7.9.5. Application. Any application submitted for approval shall submit the following items, in addition to any other required items, to show compliance with these review standards.
1. Statement of Impact on Health, Safety and Welfare. A brief written statement shall address conformance with the health, safety and welfare objectives of this guideline.
 2. Site Plan. A scaled site plan shall show the location and dimensions of all improvements, including setbacks, drives, parking, fencing, landscaping, and other information necessary to determine compliance with the development criteria of these guidelines.
 3. Rendering. A rendering of the tower, accessory facilities and compound shall depict colors, materials and treatment. If lighting or other FAA requirements for tower color is proposed, evidence of such requirement shall be submitted.
 4. Justification for a New Tower. The applicant shall document a proposal for a new tower that the planned equipment for a proposed tower cannot be accommodated on an existing tower

within the proposed service area. The applicant shall submit a written affidavit showing what attempts have been made to share an existing tower or that no such tower exists.

5. Certification of Shared Use Design. A qualified, registered engineer shall certify that the proposed tower's structural design can accommodate a minimum of two (2) shared users, in accordance with §7.9.4 Development Criteria.
 6. As Built Survey. A qualified, registered engineer shall certify that the proposed tower is to be constructed and installed in accordance with the submitted site plan including the installation of any required buffer yard.
 7. Total anticipated capacity of the structure, including the number and types of antennae that can be accommodated.
 8. Mitigation measures for ice and other hazardous falling debris, including setbacks and de-icing equipment.
- 7.9.6. Exceptions. Towers camouflaged to resemble woody trees or indigenous vegetation to blend in with the native landscape, and other types of concealment, shall be reviewed by the Design Review Board. Concealment techniques are design methods used to blend a wireless telecommunications facility, including any antennas thereon, unobtrusively into the existing surroundings so as to not have the appearance of a wireless telecommunications facility. Such structures shall be considered wireless telecommunications facilities and not spires, belfries, cupolas, or other appurtenances usually required to be placed above the roof level for purposes of applying height limitations. Due to their height, such structures must be designed with sensitivity to elements

such as building bulk, massing and architectural treatment of both the wireless telecommunications facility and surrounding development. Concealed towers on developed property must be disguised to appear as either a part of the structure housing, a principal uses, or an accessory structure that is normally associated with the principal use occupying the property. Concealed towers developed on unimproved property must be disguised to blend in with existing vegetation.

Article 8 PARKING REGULATIONS

§8.1. Off Street Parking

There shall be provided, at the time of the erection of any building or at the time any principal building is enlarged or increased in capacity by adding dwelling units, guest rooms, seats, or floor area, or before conversion from one type of use or occupancy to another, permanent off-street parking in the amount specified in [Table 8.1](#). Required parking shall be provided for each use on the site. In calculating required parking, fractions are rounded up to the next whole number; however, when multiple uses are proposed on the same site, the fractional requirement for each use is added together prior to rounding. For the purpose of calculation in non-residential uses, "storage areas, including merchandise storage areas" shall not be a part of the NFA or GFA calculation. For uses not specified, the Building Official shall determine required parking based on the most similar use in [Table 8.1](#).

- 8.1.1. Certification of Minimum Parking Requirements. Each application for zoning approval shall include the location, number and dimensions of off-street parking spaces, if required, and the means of access. This information shall be in sufficient detail to enable the Zoning Official to determine whether or not the requirements of this Article are met. The Building Permit for the use of any building, structure or land where off-street parking space is required shall be withheld by the Building Official until the provisions of this Article are fully met.
- 8.1.2. Joint Use Parking Lots. Parking facilities for one use shall not be considered as providing the required parking facilities for any other use on the same or separate lots, except as provided herein:

- 1. Under circumstances wherein a combination of uses or other factors might require total parking facilities in excess of actual need, if so determined and certified by the Zoning Official, a commensurate reduction in parking may be approved by the Commission. Two uses, for example, may share one parking facility and the spaces provided therein when the parking demand for the uses occur at wholly separate times. Furthermore, such uses need not be located on the same lot, so long as the requirements of [§8.1.3 Remote Parking](#) are met.
- 2. Shared parking for mixed-use developments. Subject to approval by the Commission, minimum parking requirements for a mixed-use development may be reduced by calculation of shared parking requirements for the development utilizing the shared parking demand information in [Table 8.1.1](#) and the Worksheet shown in Figure 8.1.1. These parking reductions shall not be available to lodging or residential uses unless such uses are part of a development also including non-lodging, non-residential uses.

Parking reductions may be allowed as part of site plan approval only if it is demonstrated to the satisfaction of the Commission that a combination of the following factors or measures are proposed by the development plan, including but not limited to:
 - a. There are no material adverse impacts on parking conditions in the immediate vicinity.
 - b. The development plan mitigates vehicular traffic impacts by proposing limited access to and from public streets.

- c. The development plan proposes the creation of new or upgraded sidewalks to help foster non-vehicular accessibility.

Table 8.1 Minimum Required Off-street Parking Spaces		
Residential Uses		
a.	Single-family dwellings (attached or detached), duplexes and triplexes	2 spaces per dwelling unit
b.	Multi-family dwellings <ul style="list-style-type: none"> • 1-BR of efficiency unit • 2-BR unit • 3+ BR unit 	<ul style="list-style-type: none"> • 1.25 spaces • 1.75 spaces • 2.0 spaces
Lodging Uses		
c.	Hotels and Motels	1 space per sleeping unit
d.	Lodging/conference rooms. The Lodging-Conference Parking Factor (LCRP) = the total conference room square footage divided by the total number of sleeping units.	<ul style="list-style-type: none"> • 0-20 LCP = 0 • 20-40 LCP = 1 space/400 sq. ft. • 40-60 LCP = 1 space/200 sq. ft. • 60+ LCP = 1 space/150 sq. ft.
e.	Lodging/restaurants and lounges. The Lodging-Restaurant Parking Factor (LRP) = total restaurant or lounge square footage divided by the total number of sleeping units (SU's)	<ul style="list-style-type: none"> • 0-10 LRP = 20% of normal requirement • 10-30 LRP = 40% of normal requirement • 30-50 LRP = 60% of normal requirement • 50+ LRP = 80% of normal requirement
Institutional Uses		
f.	Places of assembly, Funeral homes	1 space per 4 fixed seats in the largest assembly area or per 40 sq. ft. of floor area available for the accommodation of moveable seats in the largest assembly room
g.	Libraries, art museums and similar cultural facilities	1 space per 400 sq. ft. of GFA
h.	Private clubs, country clubs, and lodges	1 space per 250 sq. ft. of GFA
i.	Day care and residential care facilities <ul style="list-style-type: none"> • Day care or nursery • Assisted living facility • Independent living facility 	<ul style="list-style-type: none"> • 1 space per employee on the greatest shift plus 1 space per 10 children based on maximum design capacity • 1 space per 3 residents at max. capacity plus 1 space per 2 employees on largest shift • 1 space per 2 residents at max. capacity plus 1 space per 2 employees on largest shift
j.	Schools <ul style="list-style-type: none"> • Elementary and middle schools • High school 	<ul style="list-style-type: none"> • 2 spaces per classroom, or 1 space per 5 seats in the primary assembly area, whichever is greater • 5 spaces per classroom, or 1 space per 4 seats in the primary assembly area, whichever is greater

Table 8.1 Minimum Required Off-street Parking Spaces		
Retail, Service, Office and other Commercial Uses		
k.	Retail stores <ul style="list-style-type: none"> • up to 50,000 sq. ft. GFA • 50,000 – 90,000 sq. ft. GFA • more than 90,000 sq. ft. GFA 	<ul style="list-style-type: none"> • 1 space per 200 sq. ft. NFA • 1 spacer per 225 sq. ft. NFA • 1 space per 250 sq. ft. NFA
l.	Retail, Bulk merchandise or wholesale establishment	1 space per 300 sq. ft. NFA
m.	Retail automobile, boat, manufactured home, recreational vehicle, and similar sales establishments	1 space per 300 sq. ft. of floor area dedicated to showroom and office use, plus 1 space per service bay, plus 1 space per 5,000 sq. ft. of display area; or 10 spaces, whichever is greater
n.	Service stations, car wash	5 spaces per bay and 2 spaces per wash rack
o.	Restaurants and Lounges. Public floor area = GFA (including outdoor dining area not excluded from parking requirements) less all non-customer areas <ul style="list-style-type: none"> • Fast food restaurant 	1 space per 3 seats, plus 1 space per 2 employees on shift of greatest employment; OR 1 space per 40 sq. ft. of public floor area, whichever is greater <ul style="list-style-type: none"> • 1 space per 100 sq. ft. GFA plus 4 stacking spaces per window
p.	Bank, savings and loan or other financial institution <ul style="list-style-type: none"> • with drive-thru • without drive-thru 	<ul style="list-style-type: none"> • 1 space per 400 sq. ft. GFA plus 3 stacking spaces per drive-thru lane • 1 space per 300 sq. ft. GFA
q.	Offices <ul style="list-style-type: none"> • Professional and business offices • Medical and dental offices, clinics 	<ul style="list-style-type: none"> • 1 space per 250 sq. ft. GFA • 4 spaces per doctor plus 1.0 spaces per employee
r.	Commercial recreational and entertainment establishments <ul style="list-style-type: none"> • bowling alley or pool room • mini-golf course • golf course • stadium 	<ul style="list-style-type: none"> • 1 space per 200 sq. ft. GFA • 2 spaces per bowling lane or pool table • 1 space per hole plus 2 spaces per 9 holes plus 1 space per 2 employees • 45 spaces per 9 holes • 1 space per 5 seats (one seat is equal to two ft of bench length)
s.	Personal services	1 space per 250 sq. ft. GFA
t.	General service or repair, printing, publishing, plumbing, heating, broadcasting	1 space per 500 sq. ft. GFA
u.	Laundromat	1 space per 250 sq. ft. GFA
Light Industrial Uses		
v.	Self-storage facilities	5 spaces for office plus 1 space per 20 rental units (rows between storage buildings shall be designed for simultaneous vehicle parking and passage)

Table 8.1.1: Typical Shared Parking Demand by Use and Time of Day						
Parking Demand by Use*	Weekday 8am-5pm	Weekday 6pm-12am	Weekday 12am-6am	Weekend 8am-5pm	Weekend 6pm-12am	Weekend 12am-6am
Residential	60%	100%	100%	80%	100%	100%
Office	100%	20%	5%	5%	5%	5%
Commercial	90%	80%	5%	100%	70%	5%
Lodging	70%	100%	100%	70%	100%	100%
Restaurant	70%	100%	10%	70%	100%	20%
Entertainment	40%	100%	10%	80%	100%	50%
Movie Theater	40%	80%	10%	80%	100%	10%
Institutional (non-church)	100%	20%	5%	10%	10%	5%
Institutional (church)	10%	5%	5%	100%	50%	5%

* Different parking demands may be used than the typical shown here if documented in a parking demand study.

Figure 8.1.1: Shared Parking Reduction Worksheet Example 1*							
Shared vs. Conventional Demand	Conventional parking demand	A	B	C	D	E	F
		Weekday 8am-5pm	Weekday 6pm-12am	Weekday 12am-6am	Weekend 8am-5pm	Weekend 6pm-12am	Weekend 12am-6am
1- Residential	<i>100</i>	<i>60</i>	<i>100</i>	<i>100</i>	<i>80</i>	<i>100</i>	<i>100</i>
2 - Office	<i>100</i>	<i>100</i>	<i>20</i>	<i>5</i>	<i>5</i>	<i>5</i>	<i>5</i>
3 - Commercial	<i>100</i>	<i>90</i>	<i>80</i>	<i>5</i>	<i>100</i>	<i>70</i>	<i>5</i>
4 - Lodging	<i>100</i>	<i>70</i>	<i>100</i>	<i>100</i>	<i>70</i>	<i>100</i>	<i>100</i>
5 - Restaurant	<i>100</i>	<i>70</i>	<i>100</i>	<i>10</i>	<i>70</i>	<i>100</i>	<i>20</i>
6 - Total Parking Needed	<i>500</i>	<i>390</i>	<i>400</i>	<i>220</i>	<i>325</i>	<i>375</i>	<i>230</i>
Conventional Demand = <u>500 spaces</u>							
Shared Parking Demand (greatest value from Line 6 Columns A-F) = <u>400 Spaces</u>							
Shared Parking Reduction = <u>100 Spaces</u>							
* Figures in italics are sample calculations only.							

8.1.3. Remote Parking. All residential and lodging uses shall have the required parking spaces provided on the lot(s) on which such use is located. For all other uses, if the off-street parking space required by this Ordinance cannot be reasonably provided on the same lot on which the principal use is located, such space may be provided on land within 400 feet of the main entrance to such principal use. Said land shall not be used for other purposes unless adequate provisions for parking have been made for such other use. However, remote parking areas must be zoned the same as the principal use or as may be permitted upon appeal to the BZA.

8.1.4. Maintenance of Parking Capacity. No off-street parking facility shall be reduced to less than the amount required for the use involved.

§8.2. Design Standards

Off-street parking areas shall be improved and maintained as required herein.

8.2.1. General Requirements.

1. Ingress and egress for parking facilities shall be in accordance with access spacing standards adopted by the City Engineer. Wherever stacking space is deemed necessary by the City Engineer to prevent blocking of traffic, such space shall be required. No parking space shall block designated emergency access. Fire lanes may be required by the Fire Department.
2. No portion of any parking or stacking space shall be located within the street right-of-way or an easement not intended for such purposes, nor cross a public sidewalk.
3. Except for detached single-family dwellings and duplexes, no off-street parking space shall be permitted which

requires a vehicle to back out into a public street.

4. Except for single-family dwellings and duplexes, access drives and parking aisles shall not be used to meet minimum parking requirements.

8.2.2. Dimensions. The design and dimensions of the parking area and spaces shall be in accordance with [Table 8.2.2](#), as shown in Figure 8.2.2, and as follows:

1. Compact car spaces may be provided but shall not exceed a ratio of one (1) compact car space: three (3) standard spaces. Compact Parking Stalls, if used pursuant to this section, may be 8' stall width and 16' stall depth.
2. Handicapped spaces shall be provided as required by the Building Code.
3. Up to two (2) ft of vehicle overhang over a wheel stop may count toward the required length of a parking space. However, in such cases, the City Engineer may require additional aisle width. Vehicle overhang shall not project over a lot line, right-of-way, or required sidewalk or landscaped area.

Table 8.2.2: Parking Lot Dimensional Requirements (in feet)					
Parking Angle	0°	30°	45°	60°	90°
Stall Width (A)	8	8.5	8.5	9	9
Stall Length (B)	22	20	20	19	19
Stall Depth (C)	8	17.4	20.2	21	19
Curb Length (D)	22	17	12	10.4	9
Aisle Width (E)					
One Way	12	15	15	20	20
Two Way	20	20	20	24	24
Interlock (F)	n/a	3.9	3.2	2.3	n/a

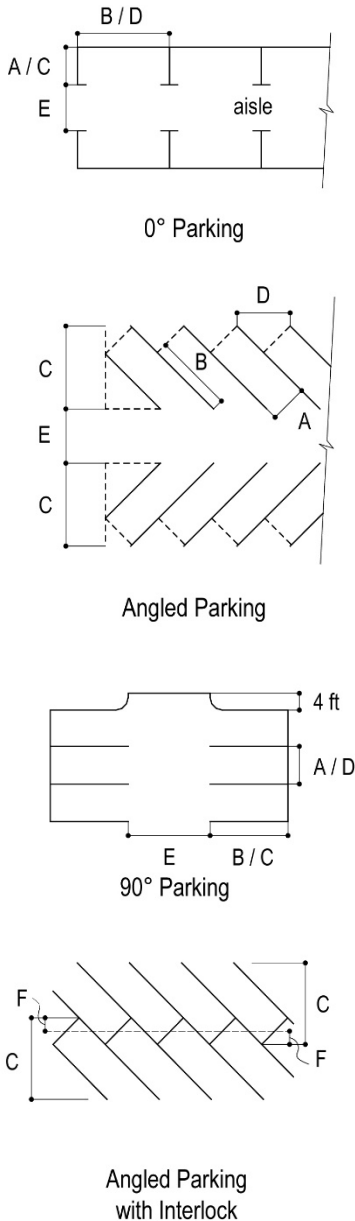


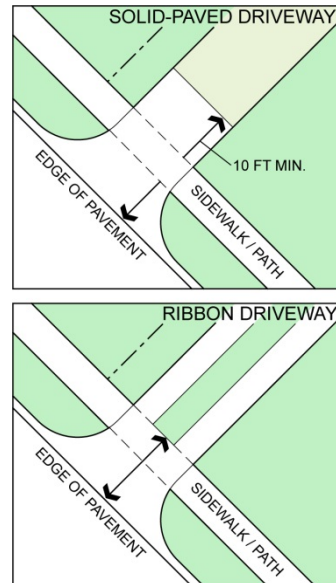
Figure 8.2.2 Parking Lot Dimensions

8.2.3. Paving Standards. All parking and vehicular use areas shall be paved with asphaltic concrete, concrete, paving stone or masonry in accord with standards adopted by the City Engineer. However, the City Engineer may approve pervious parking surfaces in areas susceptible to flooding and/or in zoning districts with restrictive impervious coverage standards. Required parking spaces shall be permanently marked and maintained and shall be accessible from a driveway

or aisle such that all vehicles approach the street in a forward motion.

Restrictions and exceptions include:

1. Detached single-family dwellings and duplexes may substitute a ribbon-type driveway or an unpaved all-weather surface, in accord with standards adopted by the City Engineer, in place of a solid-paved surface. Vehicles may approach a street in either a forward or backing motion. This shall not apply to shared driveways serving multiple residences unless approved in writing by the City Engineer.
2. All driveways that cross an existing sidewalk shall be paved from the edge of street pavement to at least ten (10) ft from the back of the sidewalk, regardless of whether the parking on-site is required to be paved or not. See illustration at right. Ribbon-type driveways shall be solid-paved from the back of sidewalk to the edge-of-pavement.



3. In addition to Paragraph 2, above, all uses, whether required to provide paved parking or an unpaved all-weather surface, driveways shall be required to pave all turn-outs and portions of

driveways located within any rights-of-way.

- 8.2.4. Pavement Markings. The City Engineer may prescribe such traffic markers and or signs as deemed necessary to safely and efficiently manage traffic flow. Parking spaces, except those serving single-family dwellings and duplexes, shall be demarcated with painted lines and/or signs or other markings accepted by the City Engineer. Stacking spaces shall not be individually marked but instead shall be clearly demarcated to direct traffic, as necessary.
- 8.2.5. Drainage. Off-street Parking facilities shall be drained to prevent damage to abutting property and streets. Landscaping areas shall be graded and designed to receive a reasonable portion of the rainfall from surrounding pavement. Openings for the flow of water shall be provided around any landscaped areas lined with protective curbing.
- 8.2.6. Dead End Parking. Vehicular use areas shall be designed to provide for safe and convenient circulation within the site. Dead end parking is discouraged. When all other design options have been exhausted, the City may approve a striped area measuring a minimum of fifteen (15) ft by the full width of the parking aisle to be used as a vehicular turnaround area. “No Parking” and “Tow Away Zone” signage must be provided in vehicular turnaround areas in order to discourage vehicular parking. Ten (10) or less consecutive parking spaces shall not be considered dead end parking.
- 8.2.7. Landscaping. Off-street parking areas extending to within twenty-five (25) feet or less of a lot line, shall be landscaped in accordance with [§9.2.2 Frontage and Perimeter Landscaping](#). Off-street parking areas of twenty-five (25) or more

parking spaces shall be landscaped in accordance with [§9.2.3 Interior Landscaping](#).

§8.3. Off-Street Loading

For all uses involving the receipt or distribution of goods by trucks, there shall be provided off-street loading berths as indicated in Table 8.3 unless modified or waived by the City Engineer. Loading berth(s) shall:

- 8.3.1. Be a minimum of twelve (12) feet in width, thirty (30) feet in length, and fourteen (14) feet in clear height.
- 8.3.2. Be screened as required in [§9.4 Screening](#).
- 8.3.3. Not occupy any part of a required buffer, rear yard or front yard.
- 8.3.4. Not be located or oriented on site so as to require trucks to back onto the property from a public street.

4,000 – 25,000 sq. ft. GFA	1 berth
25,001 – 40,000 sq. ft. GFA	2 berths
40,001 – 60,000 sq. ft. GFA	3 berths
For each additional 50,000 sq. ft. GFA	1 berth

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Article 9 LANDSCAPING REGULATIONS

The City of Vestavia Hills, Alabama, in accordance with Title 11-52-70, Code of Alabama, 1975, has determined that some regulation of landscaping property will promote the beauty and aesthetics of the City. Furthermore, the intent of these standards are: to facilitate a harmonious and attractive environment; to prevent erosion; to capture and treat drainage and stormwater runoff; to reduce glare, wind turbulence, carbon monoxide, heat, and noise; to stabilize property values; and to generally preserve and promote the establishment of a healthful and pleasant community.

§9.1. General

A landscape plan for any development subject to design review pursuant to [§13.2.2](#) shall be submitted to the Design Review Board prior to issuance of a Building Permit. If the development includes a request for rezoning or conditional use, then such landscaping plan shall also be presented to the Commission, together with the application for rezoning or conditional use, as applicable.

- 9.1.1. The landscape plan shall include the following information:
 - 1. Proposed planting schedule including the type, quantity, spacing, size, installation instructions and common name of all plantings.
 - 2. Plant materials labeled and shown in relation to lot lines, adjacent streets, buildings and parking areas.
 - 3. All Buffers required under [§9.3](#), if any.
 - 4. All Screening required under [§9.4](#), if any.
 - 5. Approaches to building entrances.
 - 6. Proposed parking areas and means of vehicular egress and ingress.
 - 7. Location, size, function and furnishings for proposed open spaces shown in

relation to lot lines, adjacent streets, sidewalks, buildings and parking areas.

- 8. All utilities and fire connections.
- 9. Proposed landscape vehicles, equipment, and materials to be stored on the property.
- 10. Soil preparation methods, bedding and mulching, and planting details
- 9.1.2. Landscaping shall be provided in accordance with the following:
 - 1. Where existing topographic patterns contribute to beauty and utility of a development, they shall be preserved whenever at all possible, practical and feasible.
 - 2. Landscape treatment shall be provided to enhance architectural features and to strengthen vistas.
 - 3. All landscaping shall be installed in accordance with accepted good planting procedures as prescribed by the American Society of Landscape Architects.
 - 4. This Article establishes requirements for site landscaping, as well as landscaping for Buffers and Screening. Landscaping provided to fulfill Buffer or Screening requirements, may also be counted, in whole or in part, toward site landscaping requirements and vice versa.
 - 5. Existing trees, plantings and other vegetation, which meet these standards, in whole or in part, may be accepted by the approving authority, to count toward landscaping requirements.

§9.2. Site Landscaping

- 9.2.1. Applicability. Site landscaping shall be provided with all new multi-family, non-residential and mixed-use developments in accordance with the following standards. Existing premises must

conform with these standards as provided in [Article 10 Nonconformities](#). Required site landscape areas include: frontage landscaping, building landscaping, parking lot interior landscaping and parking lot perimeter landscaping as shown in Figure 9.2.

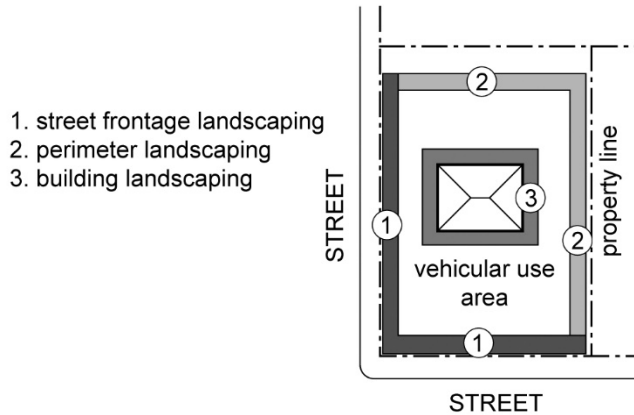


Figure 9.2 Site Landscaping Areas

9.2.2. Frontage and Perimeter Landscaping

1. Frontage landscaping shall be provided along lot frontages to reduce the visual impact of and glare from vehicular use areas, enhance the public streetscape, and to control access between private and public space where appropriate. Frontage landscaping is required for the length of parking and vehicular circulation areas that extend within twenty-five feet of the front lot line(s). Frontage landscaping shall be provided as shown in Table 9.2.2 and as follows:
 - a. For the purposes of this Subsection, corner lots shall be considered to have two frontages.
 - b. The planting strip shall be located along the outside edge of the vehicular use area
2. Perimeter Landscaping shall be provided to reduce the visual impact of and glare from vehicular use areas on adjacent property, capture and treat stormwater and to control access between

developments where appropriate. Perimeter landscaping is required for the length of parking and vehicular circulation areas that extend within twenty-five (25) of side and rear lot lines. Perimeter landscaping shall be provided as shown in Table 9.2.2 and as follows:

- a. The planting strip shall be located along the outside edge of the vehicular use area.
- b. Perimeter landscaping requirements may be modified by the Zoning Official in writing where natural conditions make such landscaping unnecessary and/or impractical.
- c. Perimeter landscaping may be waived or reduced between two vehicular use areas on abutting lots, which are connected by a cross access agreement and are of integrated design.
- d. A solid fence of a height of at least thirty (30) inches shall suffice for perimeter landscaping along an alley.

	Frontage Landscaping	Perimeter Landscaping
Min. Depth of Planting Strip	8 ft OR 4 ft and fence/wall	5 ft
Height (at maturity)	2.5–3.5 ft ⁽¹⁾	2.5 ft min.
Min. Density of Shrubs (size at time of planting)	1 3-gal shrub per 3 ft OR 1 5-gal shrub per 5 ft	
Min. Density of Trees	1 canopy tree per 50 ft OR 1 understory tree per 40 ft	
¹ Shall not exceed 2.5 ft within Clear Sight Triangle (§4.3.8 Intersection Sight Distance)		

9.2.3. Interior Landscaping shall be provided within off-street parking areas of twenty-five (25) or more spaces to capture and treat stormwater, create human scale and minimize heat islands by providing shade

and reducing reflective surfaces, as follows:

1. There shall be at least twenty (20) sq. ft. of interior landscaping per parking space.
2. Every planting area (peninsula, median or island) containing a required tree shall be at least seventy-five (75) sq. ft. and seven (7) feet in width. Each planting area shall be suitably landscaped with a variety of plant materials including but not limited to ground covers, shrubs, flowering plants, pine straw and mulch.
3. There shall be a canopy tree within eighty (80) feet or an understory tree within sixty (60) feet of every parking space, which may include trees planted to meet other landscaping requirements.
4. Landscape islands shall be provided at the end of any parking bay containing twenty (20) or more parking spaces. Trees shall be provided within said islands in accordance with §9.2.3.3 above.

9.2.4. Building Landscaping shall be incorporated along building elevations, which are thirty-five (35) feet or greater in length and are set back from property lines, to accentuate entrances, reinforce pedestrian accessways to and from parking areas, and to enhance secondary facade areas, as shown in Table 9.2.4 and as follows:

1. Building landscaping areas shall be located along or shall begin within fifteen (15) feet of each building elevation to accommodate a walkway between the building and landscaping. Other required landscaping may be counted toward Building Landscaping requirements if meeting this location requirement.
2. Required building landscaping may be aggregated into one or more locations

along the elevation to allow for pedestrian/vehicular access and loading areas along the building elevation.

Min. Depth of Planting Strip	6 ft
Shrubs per Elevation Length	10 hedge plants or shrubs per 50 ft
Trees per Elevation Length	1 canopy tree per 50 ft OR 1 understory tree per 35 ft

§9.3. Buffers

Buffers shall be provided in accord with the requirements of [Tables 8.3A](#) and [8.3B](#) and as described in this §9.3. In cases where Buffers are required or deemed necessary for the protection and/or separation of uses on abutting lots, the following provisions shall be the minimum requirements unless otherwise specified by the reviewing authority in individual cases. For the purposes of this Section, “fences” and “walls” shall have the same meaning.

9.3.1. General Requirements. Except as otherwise provided herein, buffers shall be required based on the developing use and the existing, abutting use, regardless of the zoning districts in which they are located.

1. Required yards, where corresponding with the buffer area, may overlap and may be counted toward a buffer width requirement.
2. 100 percent of the applicable buffer requirements shall be the responsibility of the developing land use, except when the developing use will abut an existing more intensive use established prior to the adoption of these standards and for which no buffer is in place. In this case, the approving authority may require up to fifty (50) percent of the required buffer width on the developing site. In such

case, the applicant shall only be required to preserve existing vegetation within the buffer width or replace such vegetation with equivalent landscaping.

3. Any required buffer abutting a park or greenway may be reduced, if the property owner dedicates land to be set aside, for all or part of the required buffer width, to the City for incorporation into the park or greenway if approved by the Council.
4. Buffer requirements may be modified by the approving authority for certain cases as follows:
 - a. When the proposed use will abut an existing, nonconforming use on a property that is designated for another use in the Comprehensive Plan *and* is zoned accordingly with said plan, the Buffer may be modified to be consistent with the projected use of the neighboring land.
 - b. If the land use relationships between two (2) abutting lots changes so that a lesser Buffer would be required, the width of the previously provided Buffer may be reduced accordingly.
 - c. If the required Buffer abuts a public alley, up to one-half (1/2) of the alley width may be counted toward the buffer width requirement but the landscaping density requirements shall not be reduced.
 - d. Whenever the proposed use abuts vacant land, buffer requirements shall be based on the zoning of the abutting property or the use projected by the Comprehensive Plan, whichever requires a lesser buffer. When determining buffer requirements based on the zoning or projected use of abutting vacant land, the Zoning Official shall consider the range of possible future uses and base the requirement on the use(s) that require a lesser buffer.

5. Golf courses, playfields, stables, swimming pools, tennis courts, and other recreational facilities; parking and other vehicular use areas; Buildings, dumpsters, and Outdoor Storage are prohibited in required Buffers. The approving authority may permit a pedestrian access way through a required Buffer, to allow access between the abutting uses, if desired.

9.3.2. Design Requirements.

1. Trees and shrubs shall be provided in accordance with [Table 9.3B](#).
2. Stormwater management and drainage controls required by the City Engineer shall be coordinated with the buffer design and integrated into the overall site design.
3. The required Buffer width and planting density may be reduced as provided in Table 9.3B when a buffer fence is provided that meets the following standards:
 - a. Buffer fences shall be of masonry, ornamental metal, durable wood, or a combination thereof as approved by the reviewing authority. Untreated wood, chain-link, plastic or wire shall not be permitted. No more than twenty-five (25) percent of the fence surface, required as a part of a buffer, shall be left open. The finished side of the fence shall face abutting property.
 - b. Buffer fences shall be a minimum of six (6) feet high and no taller than eight (8) feet. Buffer landscaping shall be placed along the exterior side. If longer than 100 feet in one direction, the fence shall have columns of wood or masonry, spaced no greater than fifty (50) feet on center and which project outward from the fence surface.

Table 9.3A Buffer Requirements By Use									
Proposed Use	Existing Abutting Uses or Zoning								
	Single-family		Multi-family	Lodging	Institutional			Business	Parks & greenways
	detached	attached			low/medium/high				
Residential and Lodging	Type of Buffer Required								
Detached, single-family	n/a	n/a	n/a	n/a	n/a			n/a	n/a
Attached, single-family	A	n/a	n/a	n/a	n/a			n/a	n/a
Multi-family	B	A	n/a	n/a	n/a			n/a	n/a
Lodging	B	B	A	n/a	n/a			n/a	n/a
Institutional									
Low intensity	A	A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Medium intensity	A	A	A	n/a	n/a	n/a	n/a	n/a	A
High intensity	B	B	B	A	A	n/a	n/a	n/a	A
Business/Commercial									
Offices up to 50,000 sq. ft.	A	A	A	n/a	A	n/a	n/a	n/a	A
Offices greater than 50,000 sq. ft.	B	B	B	n/a	B	A	n/a	n/a	A
Amusement; outdoor entertainment	B	B	B	A	B	A	n/a	n/a	A
Retail, shopping centers, and restaurants up to 50,000 sq. ft.	B	B	A	n/a	A	A	n/a	n/a	A
Retail, shopping centers, and restaurants greater than 50,000 sq. ft.	B	B	B	n/a	B	A	n/a	n/a	A
Heavy commercial, including repair, contractor and automotive uses	B	B	B	A	B	A	n/a	n/a	A
Industry									
Warehousing, storage, telecommunications towers and public utility facilities	C	C	C	C	C	B	B	A	B
Other industrial uses	C	C	C	C	C	C	C	B	B

Table 9.3B Requirements by Buffer Class					
Buffer Class	Width		Required trees per 100 lf	Required Shrubs per 100 lf	
	With fence/wall	Without fence/wall	Understory Trees	With fence/wall	Without fence/wall
A	10 ft	15 ft	9 in single row	15 in single row	20 in single row
B	15 ft	20 ft	10 in single row	20 in single row	30 in alternating or double rows
C	22 ft	30 ft	12 in single row	25 in alternating or double rows	40 in double rows

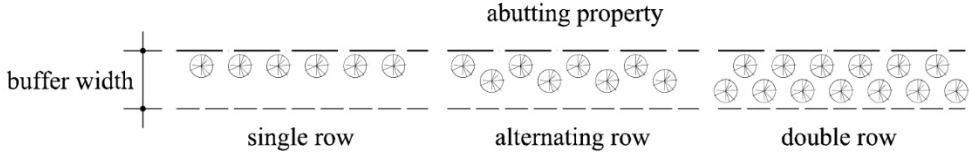


Figure 9.3: Buffer Landscaping Rows

9.3.3. Planting Requirements. The required Buffer shall be installed before a Certificate of Occupancy may be approved. Except as herein provided, plantings installed toward buffer requirements shall be in accord with the general requirements and minimum planting specifications set forth in [§9.5 Planting, Installation and Maintenance](#).

1. Existing natural vegetation, which meets, in whole or in part, buffer planting requirements, may be applied toward the requirements of this Section.
2. Trees shall be evergreen.
3. Shrubs shall be evergreen and be thirty (30) inches tall at planting. However, up to twenty-five (25) percent of the required shrubs: 1) may be deciduous, b) may be two (2) feet tall when planted, provided an average height of three (3) to four (4) feet within four (4) years; and c) when planted on a berm, may be of a lesser height, provided that the combined height of the Berms and planting is at least six (6) feet after four (4) years.

§9.4. Screening

Screening is intended to provide both visual separation of conflicting uses on-site and between adjacent properties and shall be designed to be compatible with the surrounding environment and shall not dominate the view. For the purposes of this section, “fences” and “walls” shall have the same meaning.

9.4.1. Applicability. For all multi-family, non-residential and mixed use developments, the following shall require Screening:

1. Garbage collection, recycling and refuse handling areas
2. Maintenance areas or utility structures associated with a building or development
3. Water meters, gas meters, electric meters and air conditioners/mechanical units
4. Loading docks or spaces
5. Outside runs for veterinary clinics, animal shelters, and kennels
6. Outdoor storage of materials, stock, equipment, and vehicles (such as those stored for repair)
7. Any other uses for which screening may be required by the reviewing authority

9.4.2. Safety Provisions.

1. Screening shall not conflict with §4.3.8 Sight Distance Requirements.
2. Screening shall not block access to any above-ground, pad-mounted transformer and shall provide the minimum clear distance required by the utility company.
3. Screening shall not impede or divert the flow of water in any drainage way.

9.4.3. Design Requirements. The method of screening, including height and materials, shall be that which is sufficient to visually screen the use. The minimum height needed is preferred. Fences, berms, or landscaping used for other purposes, but that are proposed as part of

a required screen and that meet the requirements of this Section, may count toward screening requirements. The design of screening shall be in accord with the following and as approved by the reviewing authority:

1. Location of uses. Location on site should be the first consideration in screening the uses listed in §9.4.1 above. The reviewing authority may lessen screening requirements when the location of the use to be screened reduces its visibility or other impact to the public and neighboring properties.
 - a. Uses requiring screening, when co-located, may be screened together.
 - b. Uses that produce objectionable noise or odors shall be located so as to minimize such impacts to the public and abutting properties.
2. Screening Fences. All screening fences shall comply with the following:
 - a. Screening fences shall be of masonry, ornamental metal, vinyl, durable wood, or a combination thereof. Untreated wood, chain-link, plastic or wire shall not be permitted. No more than twenty-five (25) percent of the fence surface, required as part of a Screen, shall be left open. The finished side of the fence shall face abutting property.
 - b. Where screening fences are longer than fifty (50) feet in one direction, evergreen landscaping shall be placed along the exterior side. Where such fences are longer than 100 feet in one direction, required landscaping shall include both trees and shrubs and the fence shall have columns of wood or masonry which project outward from the fence surface. Such columns shall be spaced no greater than fifty (50) feet on center.
 - c. Fences located forward of the front building line shall not exceed six (6) feet. Fences located in a required rear or side yard shall not exceed eight (8) feet in height.
3. Berms. Berms shall be landscaped and stabilized to prevent erosion and shall be a minimum height of four (4) feet. Slopes shall be approved by the City Engineer.
4. Shrubs and trees. Except as herein provided, plantings installed for screening requirements shall conform to [§9.5](#) following.
 - a. Shrubs shall be evergreen and spaced no more than five (5) feet on center.
 - b. Trees shall be evergreen and, when used in the absence of a fence, should have a low understory and/or be used together with shrubs to provide an opaque visual Screen.
5. Screening requirements for specific uses.
 - a. Dumpsters, trash refuse, and recycling containers shall not be located forward of the front building line. Enclosures, while allowed within the property setback lines, cannot be included within the required buffer areas or within 5' of a property line. Such containers shall be screened by a combination of opaque fence or masonry wall and plant material on three (3) sides. Opaque gates, designed to complement the screen, shall be installed for access. The fence or wall shall be at least two (2) feet taller than the container.
 - b. For restaurants, enclosures shall be sized, as needed, to accommodate the storage of grease containers.
 - c. Mechanical equipment on roofs or on site shall be screened so as to not be visible from public streets or adjacent properties. The screening of building-mounted mechanical equipment shall

be an integral component of the building design. Mechanical equipment installed on site shall be adequately screened by plant materials and/or fences and shall blend in with site landscaping.

- d. Outdoor storage, where permitted, shall be screened to a height of six (6) feet or two (2) feet taller than the material or equipment to be screened, whichever is greater.
- e. Service areas, loading docks, work yards, and similar uses should be located to minimize their visibility to the public and to any abutting properties to which such functions would be objectionable. Where their location is insufficient to effectively screen the use, required screening shall be at least six (6) feet in height. Loading berths shall be within the building or concealed by means of a screening wall of material similar to and compatible with that of the Building.

six (6) inches above ground and be a minimum twelve (12) feet in height at time of planting. At time of planting, evergreen trees shall be a minimum seven (7) feet in height and multi-stemmed trees shall be eight (8) feet in height.

- 5. Shrubs shall have a minimum height of one (1) foot measured from grade level at the time of planting.

9.5.2. Installation and Inspection.

- 1. Required plantings shall be installed at the next seasonal planting opportunity unless a written waiver has been issued by the Zoning Official.
- 2. Required landscaping materials shall be installed before a Certificate of Occupancy may be approved.
- 3. At the time of installation and upon inspection, minor changes may be approved in writing by the Zoning Official, provided the changes meet the minimum requirements of this Article. Any change, which said Official determines to be a major change, shall require a revised Landscaping Plan be resubmitted for approval.

§9.5. Planting, Installation and Maintenance

9.5.1. Planting.

- 1. All plants shall be suitable for local planting conditions and the intended landscaping purpose. All required landscaping areas shall be maintained with mulch (two inches deep at installation), sod or other approved ground cover.
- 2. Native, drought-tolerant vegetation shall be used where practicable to avoid excess water consumption for irrigation. Plans submitted for review shall identify such native species.
- 3. Required plantings shall be spaced to allow for adequate growth and coverage.
- 4. Canopy trees shall have a minimum two-and-one-half (2.5) inch caliper measured

- 9.5.3. Maintenance. The Owner shall be responsible for providing, protecting, and maintaining required plantings in a healthy and growing condition. Any dead, missing, or unhealthy plants shall be replanted at the next seasonal planting opportunity, and broken or deteriorated non-living materials shall be replaced. Planted areas shall be maintained in a healthy condition. Screening fences/walls, pavers, irrigation or other improvements shall be maintained in good condition, and any such improvement shall be replaced or repaired within thirty (30) days of its demise. Failure to comply with these maintenance requirements shall

constitute a violation of this Ordinance and shall be subject to the remedies and penalties provided in [§13.7](#).

§9.6. Tree Preservation Regulations

9.6.1. These provisions are intended to regulate the removal and/or destruction of trees within the community for the purpose of:

1. Preserving the existing character of the city, part of which is derived from existing groves of mature pine, oak and other species of trees;
2. Reducing the effects of noise and air pollution;
3. Preventing soil erosion and the siltation of drainage improvements and waterway;
4. Protection and enhancing the aesthetic qualities of the community; and
5. Adding an element of landscape maturity to new developments in the city thereby enhancing buffering, privacy and increasing the value of property.

9.6.2. Applicability and Exceptions. These regulations shall apply to each Protected Tree within the corporate limits of the City, except a Protected Tree on any lot zoned or used exclusively for single family (attached and/or detached) [*except new residential subdivisions as defined in §9.6.5.2*] and any property zoned as PUD (planned unit development).

9.6.3. General Regulations. No Protected Tree as defined in this Section shall be removed, relocated, destroyed or otherwise directly or indirectly damaged unless and until a tree permit under this Section has first been issued. The City is authorized to issue an annual permit to public utility companies exempting them from this requirement with respect to the trimming of Protected Trees that may interfere with utility lines located within public right-of-way, upon such terms and

conditions as may be determined by the City. No tree permit shall be required for the incidental trimming or pruning of a Protected Tree located on private property by the owner of the property or the owner's agent.

9.6.4. Definitions

1. Caliper: The measurement of the diameter of a tree trunk four (4) feet above existing grade.
2. Protected Tree: Any tree that has a caliper of at least six (6) inches.

9.6.5. Tree Permit

1. Any person wishing to remove, relocate, destroy, or otherwise damage a Protected Tree shall, under the provisions of this subsection, make written application to the DRB, which application shall include a landscape plan as provided before in said application or other information that adequately explains the request.
2. As part of any request for a land disturbance permit for a new subdivision with a minimum of five (5) lots, the applicant shall include, as a part of the application, a tree save plan that will preserve as many trees in the development as practical. The plan shall be approved by the Commission as part of the preliminary plat process (or final plat process if no preliminary is required) with input and recommendations from the City Engineer, the Department of Building Safety and the Vestavia Hills Tree Commission. Once approval of the tree save plan has been secured along with all other requirements concerning a land disturbance permit, the City Engineer may issue a land disturbance permit for said subdivision; or
3. Application fees for the filing of tree permit requests shall be in accordance with City of Vestavia Hills Schedule of

Fees unless it can be demonstrated to the Department of Building Safety that said tree is/has been damaged, diseased, or in danger of falling close to existing or proposed structures.

- 4. In the case of tree removal or relocation activities that will be required on a continuing or repetitive basis, the City may issue a blanket tree permit on such terms and for such duration as are determined to be appropriate under the circumstances. Completed applications shall be filed with the Committee a minimum of 15 days prior to the regular scheduled meeting and shall contain the signature of the property owner or a notarized letter assigning an agent to represent signed by the owner.
- 5. The DRB will consider approval or denial of the application at the next regularly scheduled meeting following proper filing of the completed application. If approved, a tree permit shall be issued by the Department of Building Safety authorizing the proposed activity.
- 6. The Mayor may declare an emergency and impose a temporary moratorium on the enforcement of this requirement, following severe storm events within the city.

9.6.6. Criteria for Issuance of a Tree Permit

- 1. A Tree Permit for the requested activity shall be issued if:
 - a. The tree is located in an area where a structure or improvement is to be placed according to a site plan or building permit approved by the City; or
 - b. The tree is diseased, damaged, in danger of falling close to existing or proposed structures (approved in A. above), interferes with existing or proposed essential utility services,

creates unsafe vision clearance or conflicts with other ordinances or regulations of the City; or

- c. Removal of the tree will not result in any adverse material affect to the appearance of the site, since other Protected Trees of similar age, height, and species are present on the site and/or a sufficient number of replacement trees are proposed to be planted on the site in appropriate locations and of sufficient size to prevent such adverse affect.
- d. The tree is to be removed and relocated as part of (1) the bona fide harvesting or thinning of timber from land currently assessed and managed as forest property; (2) the bona fide thinning of growth from undeveloped property for the purpose of the maintenance of the overall health of the trees and growth on such property; (3) the release from nursery inventory of trees commercially cultivated for the purpose of resale; or (4) the preservation of such tree in connection with the expansion of agricultural operations in the vicinity of such tree.

- 2. If, in the determination of the DRB that the application does not meet the above criteria, it will be denied and the reasons communicated to the applicant who may appeal the decision to the Commission within ten (10) working days by filing a written request with the City Clerk in a format or on a form as specified by the department.

9.6.7. Enforcement and Penalties. Whenever the Building Official shall determine that a violation of this Section has occurred, any of the following actions may be initiated singly or in combination:

- 1. On any new construction site, a stop work order may be immediately issued to the contractor or property owner. Upon

receipt of such order, construction may not be resumed until an approved plan authorizing the removal of the subject trees is presented to the DRB or a remediation proposal is presented to the Chairman and approved by the DRB as provided in subsection (3) below.

2. On an existing developed site, depending upon the circumstances of the violation, a formal citation may be issued to the violator as determined by the Building Official. A stop work order shall specify the nature of the violation and require that any work not permitted under this Article immediately cease and desist. The property owner shall, within, two (2) weeks, present a remediation proposal to the City for correcting the violation.
3. Each remediation proposal shall be reviewed by the Building Official, who shall present the proposal to the DRB along with a recommendation for acceptance or rejection, or modification thereof.
4. Any person violating any of the provisions of this Section shall be guilty of an offense against the City and shall, upon conviction, be punished for each violation as provided in [§13.7 Remedies and Penalties for Violation](#). Each Protected Tree removed, relocated, destroyed, or otherwise damaged without a Tree Permit shall constitute a separate violation.
5. These regulations shall not be construed to impair: (1) the right of eminent domain granted by State laws to utilities, whether public or private, or (2) their right to design, locate, erect, construct, re-construct, alter, protect or maintain utility poles, towers, lines, conduits, pipes or mains reasonably required in the public service or (3) their right to exercise authority conferred by statute, franchise, certificate of convenience and

necessity, license or easement. Maintenance, repair, and extension of any public and private utility lines or related infrastructure are expressly allowed. The preceding will apply to work done by the utility's employees, agents and contractors doing work for the utility.

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Article 10 NONCONFORMITIES

designed for such use at the effective date of nonconformity.

§10.1. General

Any use or structure existing at the time of enactment or of subsequent amendment to this Ordinance, but not in conformity with its provisions, may be continued with the following limitations. Any use or structure, which does not conform to the provisions of this Ordinance, shall not be:

- 10.1.1. Changed to another non-conforming use
- 10.1.2. Re-established after discontinuance for one year
- 10.1.3. Extended except in conformity to this Ordinance
- 10.1.4. Rebuilt after fire or damage exceeding fifty (50) percent of its fair market value immediately prior to said damage.

§10.2. Continuance

The lawful use of a structure or the lawful use of land existing at the time of the effective date of this Ordinance may be continued although such use does not conform to the provisions hereof.

- 10.2.1. If no structural alterations are made, a non-conforming use may be changed to another non-conforming use of the same or a more restrictive classification or to a conforming use, but such use shall not thereafter be changed to a less restrictive classification.
- 10.2.2. Whenever a non-conforming use has been changed to a more restrictive classification or to a conforming use, such use shall not thereafter be changed to a less restrictive classification or nonconforming use, respectively.
- 10.2.3. The Nonconforming Use of a Structure or of a premises may be hereafter extended throughout those parts of a building or premises, which were lawfully and manifestly arranged or

§10.3. Abandonment or Discontinuation

- 10.3.1. In the event that a structure or premises occupied by a non-conforming use becomes and remains abandoned for a continuous period of one (1) year, the use of the same shall thereafter conform to the use regulation of the applicable district.
- 10.3.2. In the event the use of a property, on which nonconforming improvements exist, including but not limited to, parking areas, driveways, lighting, sidewalks, buffers and screening, and other landscaping, becomes discontinued for a continuous period of one (1) year, such nonconforming improvements shall be brought into conformity with the applicable provisions of this Ordinance.

§10.4. Structural Extensions and Alterations

No structure or premises occupied by a non-conforming use shall be enlarged, extended, reconstructed or structurally altered, unless such use is changed to a use which conforms to the use regulations of the applicable district, provided, however, that a structure or premises may be physically enlarged, extended, reconstructed or structurally altered to the extent necessary for compliance with any existing and applicable law or ordinance specifying minimum standards of health and safety.

§10.5. Use Extensions

No non-conforming use shall be enlarged, extended or expanded unless such use is changed to a use, which conforms to the use regulations of the applicable district.

§10.6. New Construction Conforming

A structure or building conforming to the use regulations of the applicable district but not

conforming to any other provision of these regulations may be enlarged, extended or expanded provided that such enlargement, extension or expansion conforms to all regulations required in the district.

§10.7. Destruction

Any building or structure damaged by explosion, fire, act of God or the public enemy to the extent of more than fifty (50) percent of its fair market value immediately prior to said damage, shall not be restored except in conformity with this Section.

Article 11 SIGN REGULATIONS

§11.1. Purpose.

The purpose of these Sign Regulations is to provide specific regulations for the control of all signs designed or intended to be seen by, or attract the attention of, the public, which may be erected, displayed, maintained, or altered in the City, for the public health, safety, and welfare of the residents. Further, it is the intent of this Ordinance to:

1. Support implementation of the City of Vestavia Hills Comprehensive Plan 2004 – 2025 and any subsequent adopted amendments;
2. Encourage the effective use of signs as a means of communication in the City;
3. Acknowledge the public need of commercial and non-commercial individuality and expression balanced with the public need for an aesthetically pleasing community;
4. Provide a pleasing overall environmental setting and community appearance deemed vital to the continued economic viability of the City;
5. Protect and enhance the value of properties and to have signage appropriate to the planned character and development of each area in the City;
6. Promote quality and consistent signage within the community;
7. Provide signage standards by which all properties are to adhere;
8. Assist the applicant in understanding how to apply for signage plan approval as required; and
9. Promote the public health, safety and welfare of the City by preventing signs from becoming hazards or nuisances.

§11.2. Definitions

For the purposes of this Article, certain words and terms are defined as herein indicated and shall apply to all parts of this Article unless otherwise specified.

Unless specifically defined herein, words or phrases used in this Article shall have the meaning otherwise ascribed to them in this Zoning Ordinance. Otherwise they shall have the same meaning as they have in their common usage.

- 11.2.1. *Abandoned Sign.* A sign that no longer correctly directs or exhorts any person, advertises a bona fide business, leaser, owner, product or activity conducted or product available on the premises where such sign is displayed.
- 11.2.2. *Arterial.* For the purposes of this Article, a thoroughfare or the applicable segment thereof with four (4) or more lanes or having a posted speed limit of forty (40) or more miles per hour.
- 11.2.3. *Attached Sign.* A sign other than a freestanding sign, including wall signs, projecting signs and awning and canopy signs.
- 11.2.4. *Awning Sign.* A sign directly painted or otherwise directly affixed to an awning.
- 11.2.5. *Banner.* A flexible substrate on which copy or graphics may be displayed.
- 11.2.6. *Banner Sign.* A sign utilizing a banner as its display surface.
- 11.2.7. *Canopy.* A multisided overhead structure or architectural projection that is supported: 1) by attachments to a building on one or more sides and either cantilevered from such building or also supported by columns at additional points, or 2) supported by columns, but not enclosed by walls. The surface(s) and/or soffit of an a canopy may be illuminated by means of internal or external sources of light.

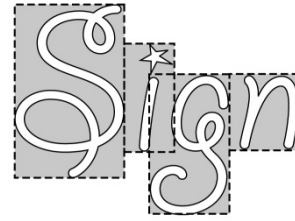
11.2.8. *Canopy Sign.* A sign directly painted or otherwise directly affixed to a canopy. When the sign appears on a canopy detached from the building, it is considered a “detached canopy sign”.

11.2.9. *Collector.* For the purposes of this Article, a thoroughfare or the applicable segment thereof, excluding an “arterial,” with three (3) or more lanes or having a posted speed limit of thirty (30) miles or more per hour. A thoroughfare with a continuous two-way left turn lane, shall be considered to have three (3) lanes.

11.2.10. *Commercial Message.* Words, symbols, logos, pictures or any combination thereof that identify or which direct attention to a business, commodity, service or entertainment sold or offered for sale or a fee.

11.2.11. *Copy Area, Sign Copy Area.* The area in square feet that can be enclosed by the smallest rectangle or combination thereof that will encompass the actual copy of a sign. Signs that are of a regular geometric shape may be calculated based upon that shape, such as circles and triangles. Spacing between letters or between letters and graphics is counted. Where different height letters are used, the sign copy area is the area of the composite shape formed by circumscribing each letter with the smallest possible rectangle. Logos shall be considered part of the copy area. For attached signs, copy area refers to the message, not to the background.

Calculating copy area



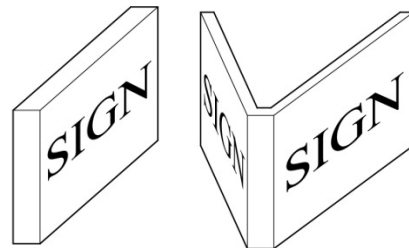
Circumscribe each letter, symbol, or graphic (including spacing between each) with the smallest possible rectangle



Copy area equals the area of the composite shape formed by the individual rectangles

11.2.12. *Department.* The City of Vestavia Hills Department of Building Safety.

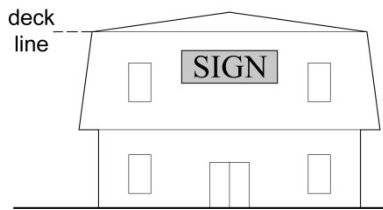
11.2.13. *Double-Faced Sign.* A sign constructed to display its message on the outer surfaces of two opposite planes. When only one face may be viewed from any vantage point along the thoroughfare, the area of one side (the larger, if applicable) is counted toward allowable sign area. If both faces may be viewed from the same vantage point, the area of both sides is counted.



Double-faced signs: For the sign above left, copy area on only one face is counted. For the sign above right, copy area of both faces is counted.

11.2.14. *Electrical Sign.* Any sign containing electrical wiring attached or equipped to be attached to an electrical energy source.

- 11.2.15. *Freestanding Sign*. Any sign erected on a freestanding frame, foundation, mast or pole and not attached in any way to any building.
- 11.2.16. *Holiday Decorations*. Decorative elements of a temporary nature intended for the acknowledgement of a holiday or holiday season, exclusive of decorations that contain business, product sales, or service advertising content. Holiday decorations shall not be considered “signs.”
- 11.2.17. *Incidental Sign*. A non-commercial sign, other than an official sign, providing information or direction for the convenience and necessity of the public.
- 11.2.18. *Integrated Business Center*. A group of commercial establishments on one or more parcels of land having shared access and/or shared parking.
- 11.2.19. *Legible*. Able to be read by a person of ordinary eyesight standing at ground level at a location on the public right-of-way or on another private property.
- 11.2.20. *Local Street*. For the purposes of this Article, a thoroughfare or applicable segment thereof with no more than two (2) lanes and having a posted speed limit less than thirty (30) miles per hour.
- 11.2.21. *Mansard Sign*. A sign integrated into a portion of a mansard roof or a mansard roof-like structure at the top of a wall and that does not extend more than two feet above the top of the wall or deck line, whichever is lower.



Mansard Sign

- 11.2.22. *Marquee Sign*. A changeable message sign mounted on a marquee or canopy.
- 11.2.23. *Message Board*. A sign that is designed to allow changing the message through the replacement of individual characters, or through electronic or other means.
- 11.2.24. *Neighborhood*. For the purposes of this Article, 1) A building or group of buildings containing ten or more multi-family dwelling units (regardless of ownership); or 2) Any area of twenty (20) or more dwelling units on individual lots located within the same subdivision plat and sharing access to city streets through the same collector or local streets or any combination thereof.
- 11.2.25. *Neighborhood Sign*. A freestanding sign located at the principal entrance or entrances to a neighborhood.
- 11.2.26. *Non-commercial Message*. Any wording or other displays other than a commercial message. Non-commercial messages are considered to be on-premises messages.
- 11.2.27. *Nonconforming Sign*. A sign which is not in conformance with the provisions of this ordinance or amendment heretofore or hereafter enacted, where such sign lawfully existed prior to the enactment of this ordinance or amendment or prior to the application of this ordinance or amendment to its location by reason of annexation.
- 11.2.28. *Off-Premise Sign*. A sign that at any time bears a message related to a commercial establishment, activity, product, or service which is sold, produced, manufactured, available or furnished at a place other than the premises on which the sign is located.
- 11.2.29. *Portable Sign*. Any sign that is designed to be transported, including, but not limited to, such signs:

1. With wheels removed;

2. With chassis or support constructed without wheels;
3. Designed to be transported by trailer or wheels;
4. Converted to an A- or T-frame sign;
5. Attached temporarily to the ground, structure, or other signs; or
6. Mounted on a vehicle for advertising purposes, parked, and visible from the public right-of-way, except signs identifying the related business when the vehicle is being used in the normal day-to-day operations of that business.

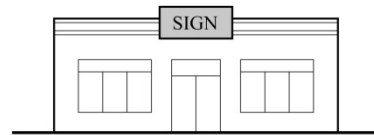
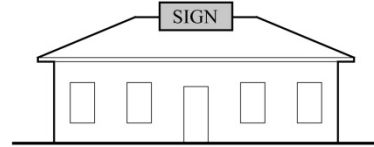
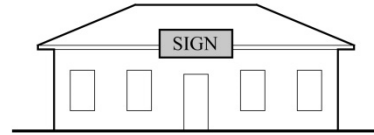
11.2.30. *Projecting Sign*. An attached sign, other than a wall sign, permanently affixed at more or less a right angle to the exterior façade of the building to which it is attached.



Projecting Sign

11.2.31. *Real Estate Sign*. Any sign pertaining to the sale, lease, or rental of land or buildings. Includes “Property for Sale,” “For Rent,” and “For Lease” signs.

11.2.32. *Roof Sign*. A sign that is mounted on the roof of a building or which is wholly dependent upon a building for support and which projects above the highest point of a building with a flat roof or the eave line of a building with a gambrel, gable or hip roof; or the deck line of a building with a mansard roof. A sign integrated into a mansard roof and that does not project above the deck line of such roof shall be considered a “mansard sign” and not a “roof sign.”



Roof Signs

11.2.33. *Sign*. Any identification, description, illustration or device illuminated or non-illuminated that directs attention to a product, services, place, activity, person, institution, business, idea, issue or solicitation, including any permanently installed or situated merchandise or any emblem, painting, banner, pennant, placard or temporary sign designed to advertise, identify or convey information.

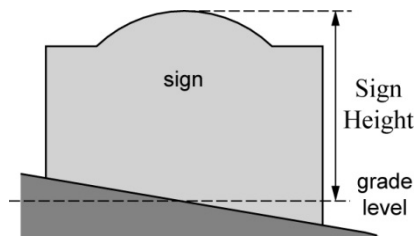
11.2.34. *Sign Area*. The entire area of a sign within a single, continuous perimeter enclosing the extreme limits of writing, representation, emblem, or any figure or character, together with any frame or other material or color forming an integral part of the display or used to differentiate such sign from the background against which it is placed.

11.2.35. *Sign Copy Area*. See “Copy Area”.

11.2.36. *Sign Face*. The entire area of a sign on which copy could be placed.

11.2.37. *Sign Height*. The vertical distance measured from the adjacent thoroughfare, grade level at the sign or upper surface of the nearest curb other than an elevated roadway, whichever

permits the greatest height, to the highest point of said sign.



Sign Height (from grade level)

11.2.38. *Sign Permit.* A permit for the installation of a sign issued by the Building Official once such a sign complies with the regulations of this ordinance and/or any variance granted by the Board of Zoning Adjustment.

11.2.39. *Sign Structure.* Any structure that supports, has supported, or is capable of supporting a sign, including decorative cover.

11.2.40. *Snipe Sign.* A sign made of any material when tacked, nailed, posted, pasted, glued, or otherwise attached to: trees, poles, stakes, rocks, fences or other object visible from but not in the public right-of-way; trees, light or utility poles, park benches, bus shelters, waste receptacles, street markers, traffic control devices, guard rails, or similar objects located on public property or right-of-way. Historical markers and official signs identifying a natural feature are not considered “Snipe Signs”.

11.2.41. *Temporary Sign.* A sign intended to display commercial messages of a transitory or temporary nature. Any such sign not permanently embedded in the ground, or not permanently affixed to a building or sign structure that is permanently embedded in the ground, is considered a temporary sign.

11.2.42. *Unlawful Sign.* A sign erected after the effective date of this ordinance and which is not in conformance with the

provisions of said ordinance; a sign which the Building Official may declare as unlawful where it poses a danger to public safety by reason of dilapidation or abandonment; or, a nonconforming sign for which a permit required under a previous sign ordinance was not obtained.

11.2.43. *Wall Sign.* A sign attached, painted or erected against or on a building wall with the face in a parallel plane to the plane of the building wall.



Wall Sign

11.2.44. *Window Sign.* Any sign attached, affixed, painted or otherwise imprinted on a window, whether applied to the interior or exterior surface of the glass. This shall also include signage attached, affixed, painted or imprinted on glass doors.

11.2.45. *Wind Sign.* A sign consisting of one or more flags, pennants, ribbons, spinners, streamers or captive balloons or other objects or material fastened in such a manner as to move freely upon being subjected to pressure by wind, whether the sign contains a commercial message or not. Wind signs exclude holiday or community decorations.

§11.3. General Provisions

11.3.1. License Required. Sign contractors must be licensed by the City. No person shall perform any work or service for any person or for any government entity for compensation, in or in connection with the erection, construction, enlargement, alteration, repair, moving, improvement, maintenance, conversion or manufacture of any sign, or any work or service in connection with causing any such work to be done unless such person shall first have obtained a sign contractor's license from the City and paid the license fees provided for by the City License Code, or shall be represented by a duly licensed agent or subcontractor.

11.3.2. Permit Fees. A sign permit fee, as may be set from time to time by the Council, shall accompany each application for a sign permit. Additional building and electrical permit and inspection fees as established by Chapter 5 of the City Code of Ordinances and shall be applied as applicable.

Specific sign permit procedures can be obtained by contacting the Department of Building Safety, hereinafter referred to as "the Department".

11.3.3. Building and Electrical Permits. Building permits and electrical permits for all signs shall be obtained as required by the International Building Code and National Electrical Code, respectively. Compliance with the requirements of the building code and electrical code in effect at the time of any installation, modification or repair of a sign is required, in addition to conformance with this Article and all other applicable codes and ordinances of the City. Applications for required sign permits and related electrical and building permits may be submitted simultaneously and will be

processed together, within the time limits established in this Ordinance.

11.3.4. Sign Permit.

1. Any person, organization, or corporation desiring to erect, construct, enlarge, move, alter, or convert any sign in the City must obtain a "Sign Permit" for each sign as required by [§11.3.2](#), except for those actions that do not require a permit under the provisions of [§11.3.5](#). Application instructions are available from the Department. Application shall be made to the Department. Every sign permit shall become null and void if work has not commenced within 120 days of the issuance date of the permit. If the work permitted by a sign permit is suspended or abandoned for 120 days anytime after commencement, a new permit shall be obtained. Temporary sign permits shall be obtained as required in [§11.8](#). Additionally, any sign permit shall become null and void if the sign varies in any respect from the approved design or location.

2. All nonconforming signs on a premises shall be removed or shall be made to conform with these regulations as part of the work under any (permanent) sign permit being applied for.

11.3.5. Actions Not Requiring a Permit. The following signs and actions related to signs shall be exempt from the permit requirements of this Ordinance but shall be subject to all other standards of this Ordinance. Certain temporary signs are subject to temporary permits, see [§11.8](#).

1. Changing of the commercial message on an existing painted or printed sign, marquee, changeable copy sign or a similar conforming sign, whether electrical, illuminated, electronic message center or non-illuminated painted message, provided that the copy

on an electronic message board shall not change more frequently than allowed under [§11.5.1](#).

2. Painting, repainting, cleaning, or other normal maintenance and repair of a sign not involving structural changes. Any maintenance or repair to improve the structural integrity of the sign shall require a Sign Permit and design drawings submitted, if applicable. Repainting the entire sign face shall also require a Sign Permit.
 3. Installation of permanent signs smaller than four sq. ft. where such signs are permitted by this ordinance, contain no commercial message and involve no electrical installation.
 4. Installation of signs exempt from these regulations as defined in [§11.4.2](#).
 5. Installation of signs subject to other standards as defined in [§11.4.3](#).
 6. Installation of signs permitted in all districts as defined in [§11.4.4](#).
 7. Temporary Signs announcing the sale or rent of property. One (1) on-premises sign, not exceeding an area of six and one-half (6.5) sq. ft. on a residential lot nor thirty-two (32) sq. ft. on a non-residential lot shall be permitted per lot but shall not interfere with traffic visibility at intersections of public streets and/or private drives; and shall be removed within four (4) days after a sale, lease or rental.
- 11.3.6. Sign Contractor's Requirements. As a condition to issuance of a business license as required in [§11.3.1](#), all persons engaged in the business of installing or maintaining signs which involves in whole or in part, the erection, alteration, relocation, or maintenance of a sign or other sign work in or immediately adjacent to a public right-of-way shall agree to hold harmless and indemnify the City, its officials, agents, and employees from any and all claims of personal injury or property damage resulting from the erection, alteration, relocation or maintenance of a sign or other sign work.
 - 11.3.7. Permission to Install. No person shall erect, construct, alter, or maintain any sign upon any property or building without the consent of the owner or person entitled to possession of the property or building if any, or their authorized representatives.
 - 11.3.8. Denial. The Department may, in writing, suspend or revoke a permit issued under the provisions of this Ordinance whenever the permit is issued on the basis of a misstatement of fact or fraud. When a sign permit is denied by the Department, a written statement shall be provided to the applicant with the reason for the denial. The applicant may appeal the decision to the BZA.
 - 11.3.9. Time Limits. The Department shall, within five days of receipt of an application for a sign permit: approve the application; deny the application, stating the specific reasons for denial, with reference to specific sections of this ordinance; or return the application to the applicant as incomplete, specifying exactly what additional submittals are required to make the application complete.
 - 11.3.10. Prior Variances. All prior variances on permanent signs not in compliance with this Ordinance shall come in compliance in the time frame specified in this Ordinance. Temporary signs which are inconsistent with the provisions of this ordinance shall be removed or brought into conformance within five (5) days after the passage of this ordinance, regardless of whether such a sign may be subject to a variance allowing such

inconsistency. The BZA may grant a subsequent variance in accordance with [§12.4](#).

11.3.11. Administrative Enforcement

1. Procedure. If at any time the Department, after an inspection, determines that a sign has been erected, maintained, modified, or abandoned, or any combination thereof, in violation of any provision of this Article, the Department shall proceed in accordance with this subsection. Upon such determination, the Department shall prepare a notice which shall describe the sign and its location and which shall state, if the violation or violations are not corrected within ten (10) working days after receipt for permanent signs or within 24 hours after receipt when violations pertain to temporary, portable, or other non-permanent types of signs, the sign, including the sign face, supports, and all structural members pertaining to said sign, shall be removed and the cost of said removal billed to the property owner and/or sign owner. All notices mailed by the Department shall be sent by certified mail, return receipt requested, or personally served by an employee or agent of the City. Any time periods provided for in this Article relative to compliance shall be deemed to commence on the date of receipt noted on the certified mail return receipt. All notices shall be mailed to the owner of the property on which said sign is located as shown on the latest available tax maps and/or the owner of the sign itself.
2. Removal of Signs on Private Property. If, after the notice required by §11.3.11.1, the sign owner does not correct the matter identified within thirty (30) working days, the Department may cause to be removed, any sign that endangers the public safety, such as an abandoned,

dangerous, or materially, electrically, or structurally defective sign, or a sign for which no sign permit has been issued.

3. Signs in the Public Right-of-Way. Except where specifically permitted in [§11.4.5](#), any sign erected in the public right-of-way or on public property shall be deemed abandoned and may be removed by the Department without notice or compensation to the owner. Removal by the Department shall not affect penalties applicable for the unlawful erection or placement of the sign in the public right-of-way or on public property.

11.3.12. Substitution of Message. Any sign allowed under this Article, may contain, in lieu of any other message or copy, any lawful noncommercial message.

11.3.13. Maintenance and Other Requirements

1. Maintenance of Signs. Every sign, including but not limited to those signs for which permit fees are required, shall be maintained in good structural condition at all times. The Building Official or his authorized agent shall inspect and have the authority to order the painting, repair, alteration, or removal of any sign which has become dilapidated, abandoned, unlawful or which constitutes a physical hazard to public safety after fifteen (15) days has lapsed from the Notice of Violation or Certified Letter to the property owner, last known owner, manager or employee of the business. Any repair, painting, alteration or removal will be at the expense of the property owner or business owner, as applicable.
2. Obsolete Sign Copy. Any sign copy that advertises or identifies a use no longer conducted on the property on which said sign is erected must have the sign copy covered or removed within 30 days after written notification from the Department.

However, obsolete sign copy may only be covered for six months, at which time such copy shall have been removed. The Department shall send written notice to that effect. Upon failure to comply with such notice, the Building Official is authorized to cause removal of such sign copy and any expense incident thereto shall be paid by the owner of the building, structure, or land on which the sign is located.

3. Nonconforming Signs associated with spaces or property remaining unoccupied for a period in excess of 270 consecutive days, shall be removed.

§11.4. General Sign Regulations

11.4.1. Prohibited Signs. It shall be unlawful to erect, cause to be erected, maintain or cause to be maintained, any sign not expressly authorized by, or exempted from these regulations. The following signs are expressly prohibited in all zoning districts:

1. Banner Signs and their temporary support posts except as allowed for temporary signs in [§11.8](#).
2. Signs that are in violation of the Building Code or Electrical Code adopted by the City of Vestavia Hills.
3. Portable signs.
4. Off-premise signs.
5. Beacons and searchlights.
6. Inflatable signs, figures, and tethered balloons.
7. Roof signs.
8. Wind signs.
9. Any sign that simulates or imitates in size, color, lettering or design any traffic sign or signal, or that makes use of words, symbols, or characters in such a

manner to interfere with, mislead or confuse pedestrian or vehicular traffic.

10. Any sign consisting of any moving, rotating, flashing, or otherwise animated light or component, except for permitted message boards.
11. Strips or strings of lights outlining lot lines or sales areas. This prohibition does not include neon and LED lighting on buildings. If neon or LED is used to depict wording or logos, it will be calculated as part of the overall allowable signage. Outlining or other specialized lighting that does not include a commercial message or logo but that is used as an element of building design may be allowed with approval by the Design Review Board.
12. Signs that emit audible sound, odor, visible matter such as smoke or steam, or involve the use of live animals.
13. Signs or sign structures that interfere in any way with free use of any fire escape, emergency exit, or standpipes, or that obstruct any window to such an extent that light or ventilation is reduced to a point below that required by any provision of the Zoning Regulations or any other ordinance of the City;
14. Signs that are of such intensity or brilliance, including LED and electronic message boards, as to cause glare or impair the vision of motorists, cyclists, or pedestrians, including flashing light signs on parked vehicles; see also [§11.5.1 Regulations for Message Boards](#).
15. Snipe signs, excluding those specifically permitted under [§11.4.5 Signs allowed in Rights-of-Way](#).
16. Signs legible from a public right-of-way that use the word "stop" or "danger" or otherwise present or imply the need or requirement of stopping, caution, the

existence of danger, or which for any reason are likely to be confused with a traffic control sign specified by the Alabama Manual of Uniform Traffic Control Devices.

17. Signs with a commercial message on any broadcasting or telecommunications tower or any antenna, except call letters of a broadcasting station.
18. Vehicles or trailers, which contain commercial messages, where such a vehicle or trailer is parked so that the advertising is legible from the public right-of-way and such vehicle or trailer is not used in the regular conduct of the business which it advertises, to include delivery vehicles.

Nothing in this ordinance shall prohibit or limit the outdoor display of products where such displays are allowed under the zoning ordinance. This ordinance shall, however, apply to any sign, banner, pennant, or other attention-attracting device affixed to a product displayed outdoors.

- 11.4.2. Exempt Signs. Signs listed in this subsection are entirely exempt from this Ordinance, except that such signs shall conform to the requirements of the City of Vestavia Hills Building and Electrical Codes, including the application for a building and electrical permits, and any other applicable ordinance or regulation within this jurisdiction.

1. Any sign installed in a building or enclosed space and not legible from the public right-of-way or from private or public property other than the property on which it is located.
2. Any sign with a sign area of less than four sq. ft. and less than four (4) feet in height (if freestanding), that is not separately lighted and that is not legible from the public right-of-way or from

private or public property other than the property on which it is located.

3. Official signs.
4. Stadium signs. Scoreboards and incidental advertising signs intended to be viewed from within a stadium.
5. Any sign erected within a Planned Unit Development (PUD) established and approved pursuant to the provisions of [§6.9](#) of the Zoning Ordinance as amended.

- 11.4.3. Signs Subject to Other Standards. Signs listed in this Section shall be exempt from the permit requirements of this Ordinance; but, shall, to the maximum extent allowed by law, be subject to the other standards of this ordinance. Where a sign is erected pursuant to a statute or a court order, the sign may exceed the size standards of this ordinance or otherwise deviate from the standards set forth in this ordinance to the extent that the statute or court order expressly required the larger size or other deviation. In all other respects, such signs shall conform to the standards of this ordinance. This sub-section shall apply to the following types of signs:

1. Signs conforming to the Manual of Uniform Traffic Control Devices and bearing no commercial message;
2. Signs bearing no commercial message and installed by employees or officials of the City, a state or federal agency in the course of their governmental duties;
3. Signs required by a state or federal statute;
4. Signs required by an order of a court of competent jurisdiction;
5. Signs installed by public utilities in their rights-of-way or on their facilities and bearing no commercial message other

than such messages necessary to identify the use;

6. Signs installed by a transit company with a franchise or other right to operate in the City, where such signs are installed along its routes and relate to schedules or other information about the transit route;

11.4.4. Signs Permitted in All Districts. The following signs are allowed without a sign permit and are not to be included in determination of the allowable numbers, type and area of a sign that requires a sign permit. If a sign otherwise falling under this section is electrified, it will require an electrical permit. Signs subject to this Section shall conform to the requirements specified:

1. Address Numbers. Signs used for the purpose of identifying the E-911 address of any building shall not be counted toward sign area provided such signs are not larger than two (2) square foot in area.
2. Incidental signs, whether freestanding or attached, that are smaller than four (4) sq. ft. in area and less than four (4) feet in height;
3. Memorial Signs. Signs or tablets, names of buildings and date of erection, when cut into any masonry surface or inlaid so as to be part of the building or when constructed of bronze or other incombustible material, provided that no such sign shall exceed six sq. ft. in area nor shall any such sign be separately illuminated.
4. Non Commercial Flags. Flags that do not contain a commercial message must be displayed in accordance with the applicable protocol. No premise shall contain more than four flags.
5. Window Signs. Window signs that total no more than thirty-three (33) percent of

the window area per window. A window sign may be made of paper or other material and will not be considered a banner if affixed to the inside of a window. A lighted window sign is subject to requirements of the City Electrical Code.

6. Non-commercial Signs. In addition to any other permanent or temporary signage otherwise provided for in this Article, each occupied lot shall be permitted an aggregate sign area of fifteen (15) sq. ft. for non-commercial speech, which shall not be illuminated, shall not exceed six and one-half (6.5) sq. ft. in area per sign and shall not exceed five (5) feet in height. In addition, the following provisions shall apply to non-commercial signage during an election, which shall include 180 days preceding and including the day of a governmental election; and, whenever a run-off election is scheduled, the 180 day period shall be extended through the date of the run-off election:
 - a. Signs may be placed on private property, buildings, or motor vehicles. With permission of the owner, signs may be placed on the property and portions of the street right-of-way maintained by the owner, provided that no sign shall be placed in any state right-of-way nor protrude into or over paved or improved streets, sidewalks, or gutters. All signs shall be removed within forty-eight (48) hours after the election has been determined. For municipal elections, the locational allowances herein shall not apply until the final day of filing of statements for candidacy.
 - b. The aggregate non-commercial sign area for non-residentially-zoned, occupied lots shall be increased to thirty-two (32) sq. ft. Non-commercial

- signs shall be subject to a maximum sign area of thirty-two (32) sq. ft. and a maximum height of eight (8) ft.
- c. Motor vehicles displaying signage may not be parked, except in the normal course of business, in a parking lot, on a public street, or similar public location
 - d. Notwithstanding the above, any signs deemed a hazard to safety are prohibited and subject to removal by the City.
7. Property Management Signs. Signage that identifies the entity responsible for the management or leasing of property is permitted in all districts provided it is: 1) incorporated into a permitted freestanding, wall, or projecting sign or 2) is incorporated into or meets the criteria for an exempt sign pursuant to [§11.4.2](#). In no case, shall additional freestanding, wall or projecting sign area or an additional freestanding, wall or projecting sign be permitted for conveying property management information.
- 11.4.5. Signs allowed in Rights-of-Way. The following signs, and no other signs, are allowed in the public right-of-way:
- 1. Signs conforming to the Alabama Manual of Uniform Traffic Control Devices and bearing no commercial message;
 - 2. Signs bearing no commercial message and installed by employees or officials of the City, a state or federal agency in the course of their governmental duties;
 - 3. Signs required by a state or federal statute;
 - 4. Signs required by an order of a court of competent jurisdiction;
 - 5. Election or campaign signs installed pursuant to [§11.4.4.6.a](#);

- 6. Signs installed by public utilities in their rights-of-way or on their facilities and bearing no commercial message other than such messages necessary to identify the user; and
- 7. Signs installed by a transit company with a franchise or other right to operate in the City, where such signs are installed along its routes and relate to schedules or other information about the transit route.

§11.5. Regulations for Certain Sign Types

- 11.5.1. Message Boards. Message boards on which the message is changed electronically shall be permitted only in those districts in which “message board” is listed as a permitted sign type and shall be subject to the following additional restrictions.
- 1. Sign display technology shall be programmed so that the message or image on the sign changes no more often than every eight seconds.
 - 2. There shall be no effects of movement, flashing, scintillation, or similar effects in the individual images.
 - 3. Changes of image shall be substantially instantaneous as seen by the human eye and shall not use fading, rolling, window shading, dissolving or similar effects as part of the change.
 - 4. Message boards shall use automatic level controls to reduce light levels at night and under cloudy or other darkened conditions, in accordance with the following standards. All electronic or digital display unit message boards shall have installed ambient light monitors, and shall at all times allow such monitors to automatically adjust the brightness level of the electronic message board based on ambient light conditions. Maximum brightness levels shall not exceed 5,000 nits when measured from

the sign's face at its maximum brightness, during daylight hours and 500 nits when measured from the sign face at its maximum brightness between dusk and dawn, i.e., the time of day between sunrise and sunset.

5. Any sign using video technology which malfunctions, fails, or ceases to operate in its usual or normal programmed manner causing therein motion, movement, flashing or any other similar effects, shall be repaired or disconnected within twenty-four (24) hours by the owner or operator of such sign.
6. The area consisting of electric or electronic message board elements shall not exceed 200 sq. ft..
7. The following limitations shall apply to the location of signs using video technology for a message board:
 - a. A sign on which the video technology includes 100 or more sq. ft. of sign area shall not be erected within 500 feet of property falling in one of the city's residential zoning districts, although this restriction shall not apply to the city's mixed use districts and commercial districts allowing residential uses.
 - b. A sign on which the video technology includes twenty (20) or more sq. ft. of sign area but less than 100 sq. ft. of sign area shall not be erected within 200 feet of property falling in one of the city's residential zoning districts, although this restriction shall not apply to the city's mixed use districts and commercial districts allowing residential use.
 - c. A sign on which the video technology includes less than twenty (20) sq. ft. of sign area shall not be erected within 100 feet of property zoned and use exclusively for single family uses: it is

the express intent of this provision to allow the use of such technology on signs for institutional uses located in residential districts, provided that the required separation is maintained.

- 11.5.2. Freestanding and Detached Canopy Signs. Except as otherwise provided for integrated business centers, non-residential uses shall be limited to one freestanding sign and one detached canopy sign per establishment. However, establishments fronting on more than one thoroughfare shall be permitted one freestanding sign and one detached canopy sign per frontage, subject to the following:
 1. Freestanding Signs.
 - a. The width of the base shall be no less than eighty (80) percent of, and no greater than 120 percent of, the width of the permitted copy area. The BZA may alter the base requirements of the sign, but such shall not be less than fifty (50) percent of the copy area permitted.
 - b. Maximum sign height shall be based upon the classification of the street along which the sign is placed, as follows:
 - (1) Arterial: fifteen (15) ft
 - (2) Collector: ten (10) ft
 - (3) Local Street: eight (8) ft
 - c. The sign may be illuminated or non-illuminated.
 - d. The sign shall be no closer than ten (10) feet to the edge of pavement of any street and no closer than twenty (20) feet from a sign on an adjoining property. No sign shall be placed on the right-of-way.
 - e. The sign may contain a message board, which shall count as part of the total copy area permitted.

2. Detached Canopy Signs.

- a. The sign shall be flat against the surface of the canopy, which shall extend no closer than two (2) feet horizontally to the curb line of any public thoroughfare nor eight (8) feet vertically from the finished surface directly below.
- b. The permanently-affixed copy area shall not exceed an area equal to twenty-five (25) percent of the surface area of the detached canopy, which surface area shall not be counted as part of the sign area.

11.5.3. Attached Signs. Each establishment shall be allowed attached signage on each facade or on any elevation that faces a public parking lot or a parking lot directly associated with the establishment. No more than two forms of attached signage (i.e., one wall sign and one awning sign) shall be permitted on one elevation, subject to the maximum attached sign area permitted on any one elevation. Attached sign copy area, including the maximum aggregate copy area for attached signage permitted on multiple elevations, shall be as described in [Table 11.5.3](#) and as provided in Paragraphs 1 and 2 following.

1. For attached signs placed less than 250 feet from the nearest thoroughfare right-of-way: Where an establishment, per this Section, may be permitted attached signage on more than one elevation, the aggregate, attached sign copy area on each elevation shall not exceed the area specified in Row 1. Each such establishment is permitted an aggregate copy area for all permitted attached signs as specified in ROW 2.

For example, if an establishment with a GFA of 2,500 sq. ft. is permitted attached signage on each of two elevations, the

amount in Row 2 (40 sq. ft.) is multiplied by “2” to determine how much copy area may be distributed among the two permitted attached sign locations. A total of 80 sq. ft. of attached sign copy area would be permitted with no individual sign being larger than 50 sq. ft.

2. For attached signs placed 250 feet or more from the nearest thoroughfare right-of-way: Where an establishment, per this Section, may be permitted attached signage on more than one elevation, the aggregate, attached sign copy area on each elevation shall not exceed the area specified in Row 3. Each such establishment is permitted an aggregate copy area for all permitted attached signs as specified in Row 4.

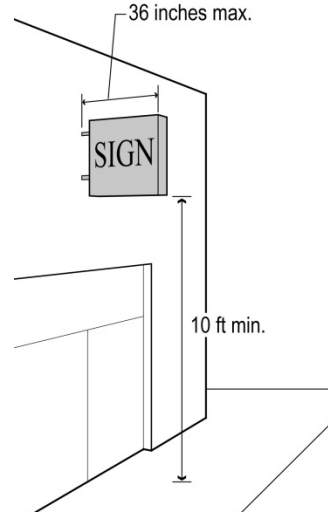
For example, if an establishment with a GFA of 2,500 sq. ft. is permitted attached signage on each of two elevations, all of which are 250 feet or more from the nearest thoroughfare right-of-way, the amount in Row 4 (48 sq. ft.) is multiplied by “2” to determine how much copy area may be distributed among the two permitted attached sign locations. A total of 96 sq. ft. of attached sign copy area would be permitted with no individual sign being larger than 60 sq. ft.

3. Wall Signs. Where permitted, wall signs shall not extend out from the face of the building more than 18 inches.

Table 11.5.3 Attached Sign Area				
For attached signage placed less than 250 feet from the nearest thoroughfare				
GFA of building or tenant space	2,000 sq. ft. or less	2,001-5,000 sq. ft.	5,001-10,000 sq. ft.	10,001 sq. ft. or greater
1. max. copy area per sign	32 sq. ft.	50 sq. ft.	70 sq. ft.	100 sq. ft.
2. max. aggregate copy area (per no. of permitted sign locations)	28 sq. ft.	40 sq. ft.	55 sq. ft.	70 sq. ft.
For wall signs placed 250 feet or more from the nearest thoroughfare				
3. adjusted max. copy area	48 sq. ft.	60 sq. ft.	80 sq. ft.	120 sq. ft.
4. adjusted max. aggregate copy area (per no. of permitted sign locations)	42 sq. ft.	48 sq. ft.	60 sq. ft.	84 sq. ft.

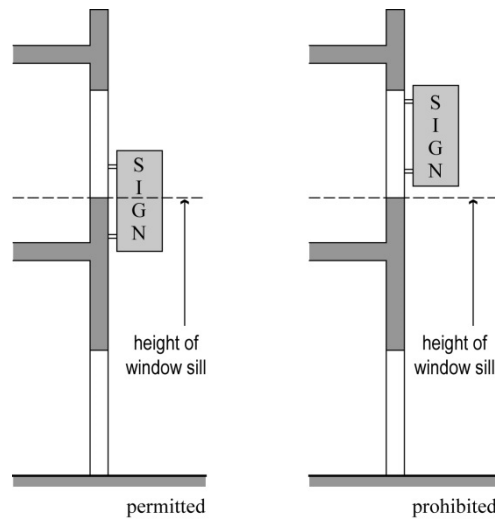
4. Projecting Signs. Where permitted, projecting signs may be either illuminated or non-illuminated, provided no other signs for such establishment are located on the same building wall. Additionally:

- a. Such sign(s) shall not project outward more than thirty-six (36) inches from the face of the building and shall have a minimum clearance of ten (10) feet above the ground level or sidewalk to the lowest point on the sign.



Maximum Projection of Projecting Sign

- b. Such sign(s) shall not project into public right-of-way nor exceed sixteen (16) sq. ft. in sign area.
- c. A bottom of a projecting sign shall not extend vertically above the window sill of the second story of a multi-story building to which it is attached.



Projecting Sign on multi-story building

5. Awning, Attached Canopy and Marquee Signs. Where permitted, awning and attached canopy signs may be painted on, applied to, or otherwise be a part of the fabric or other non-structural material. Additionally,:

- a. The sign shall be flat against the surface of the awning or canopy, which shall extend no closer than two (2) feet horizontally to the curb line of any public thoroughfare nor eight (8) feet vertically from the finished surface directly below.
- b. Awning signs shall not be internally-illuminated.
- c. The permanently-affixed copy area of canopy or marquee signs shall not exceed an area equal to twenty-five (25) percent of the surface area of the canopy, marquee or architectural projection upon which such sign is affixed or applied, which surface area shall not be counted toward allowable sign area.

§11.6. Signs Permitted By District

11.6.1. Business and Office Districts (B-1, B-1.2, B-2, O-1, O-2). Each City licensed business or other organization shall be permitted the following types of signage. For integrated business centers, refer to [§11.7](#).

1. Freestanding Signs, subject to [§11.5.2](#). Freestanding signs shall not exceed 40 sq. ft. in copy area, except that where two (2) freestanding signs are permitted, each shall not exceed thirty-two (32) sq. ft. of copy area.
2. Detached canopy sign subject to [§11.5.2.2](#).
3. Attached Signs, subject to [§11.5.3](#).
 - a. Wall sign, subject to [§11.5.3.3](#) or projecting sign, subject to [§11.5.3.4](#).
 - b. Awning, attached canopy, or marquee sign, subject to [§11.5.3.5](#).
4. Message Board, subject to [§11.5.1](#). Message board shall be included within, not in addition to, any freestanding or attached sign permitted under Paragraph

1 or 3 above. Not more than one message board shall be permitted per premises.

5. Temporary signs allowed under [§11.8](#);
6. Other signs expressly allowed under [§11.4.4 Signs Permitted in All Districts](#) or other sections of this Article.

11.6.2. Commercial Districts (B-3). Each City-licensed business or other organization shall be permitted the following types of signage. For integrated business centers, refer to [§11.7](#).

1. Freestanding Signs, subject to [§11.5.2](#). Freestanding signs shall not exceed 80 sq. ft. in copy area. Each shall be no more than ten (10) feet long.
 2. Detached canopy sign subject to [§11.5.2.2](#).
 3. Attached Signs, subject to [§11.5.3](#).
 - a. Wall Sign, subject to [§11.5.3.3](#) or Projecting Sign, subject to [§11.5.3.4](#).
 - b. Awning, Attached Canopy, or Marquee Sign, subject to [§11.5.3.5](#).
 4. Message Board, subject to [§11.5.1](#). Message board shall be included within, not in addition to, any freestanding or attached sign permitted under Paragraph 1 or 3 above. Not more than one message board shall be permitted per premises.
 5. Temporary signs allowed under [§11.8](#).
 6. Other signs expressly allowed under [§11.4.4 Signs Permitted in All Districts](#) or other sections of this Article.
- 11.6.3. Institutional (INST-1). Each City licensed business or institution shall be permitted the following types of signage:
1. Freestanding Sign, subject to [§11.5.2](#). Such sign shall not exceed thirty-two (32) sq. ft. in copy area. Such sign shall be no more than eight (8) feet long.
 2. Attached Signs, subject to [§11.5.3](#).

- a. Wall Sign. Permitted subject to [§11.5.3.3](#).
 - b. Projecting Sign, subject to [§11.5.3.4](#).
 - c. Awning, Attached Canopy, and Marquee Signs, subject to [§11.5.3.5](#).
3. Message Board, subject to [§11.5.1](#).
Message board shall be included within, not in addition to, any freestanding or attached sign permitted under Paragraph 1 or 2 above. Not more than one message board shall be permitted per premises.
 4. Places of Public Assembly. Places of assembly shall be allowed one additional freestanding or attached sign not to exceed twenty (20) sq. ft. in copy area or an additional twenty (20) sq. ft in copy area that may be used to increase the maximum copy area of a freestanding or wall sign otherwise permitted in this §11.6.3.
 5. Temporary signs allowed under [§11.8](#).
 6. Other signs expressly allowed under [§11.4.4 Signs Permitted in All Districts](#) or other sections of this Article.
- 11.6.4. Residential Districts. The following signs shall be permitted for each neighborhood within an E-2, R-1, R-2, R-3, R-4, R-5, R-6, R-7, R-8, R-9 or RC-1 District:
1. Any dispute over whether a proposed sign will serve a “neighborhood” shall be referred to the Planning Commission for determination of the boundaries of the neighborhood. If the Commission fails to determine the boundaries of the proposed neighborhood within sixty (60) days of the submittal of an application for a neighborhood sign to the Building Official, then the neighborhood shall be deemed to be that area designated in the original application, and the application processed accordingly.
 2. One freestanding sign shall be permitted at each principal entrance to the neighborhood. Sign shall not exceed thirty-two (32) sq. ft. of copy area. If there are walls on both sides of the entrance to the development or neighborhood, then one wall sign per side is permitted in lieu of a freestanding sign, each not to exceed sixteen (16) sq. ft. in copy area.
 - a. A “principal entrance” shall be considered to be that place where property included within the neighborhood abuts a collector or thoroughfare shown on the city's master street plan or other transportation plan;
 - b. There shall not be more than one “principal entrance” for each 20 dwelling units in a neighborhood, provided that a neighborhood as defined in this Article shall be entitled to at least one such sign;
 - c. The permitted signs shall be located on private property owned in common by residents of the neighborhood, or, with the permission of the property owner, on private property owned by one or more individuals and located at a principal entrance to the neighborhood;
 - d. The permitted neighborhood sign(s) shall bear no commercial message;
 - e. The permitted neighborhood sign(s) may be lighted by direct white light but shall not otherwise be illuminated.
 3. Street signs shall be of the standard design used commonly in the City, or of such other design as may be approved by the Council. Location of such signs shall be approved by the City Engineer.
 4. As a temporary use accessory to the permitted activity of lawful subdivision development, one temporary sign shall be permitted at each principal entrance to

the subdivision in accordance with the following:

- a. There shall in no case be more than one such sign for a subdivision or development with fifty (50) or fewer lots included in the subdivision or development and no more than two such signs for any other subdivision or development.
- b. Such sign shall not be illuminated and shall not exceed twenty-four (24) sq. ft. in area;
- c. Such sign shall be removed upon the earlier of: installation of a permanent neighborhood identification sign; or sale of more than ninety (90) percent of the lots in the subdivision.
- d. Sign permit is renewable on an annual basis.

11.6.5. Signs Allowed for Individual Residential Units in Agricultural and Residential Districts. The following signs shall be allowed for individual dwelling units within an A-1, E-2, R-1, R-2, R-3, R-4, R-5, R-6, R-7, R-8, R-9 or RC-1 District:

1. One wall sign, not to exceed two sq. ft. in area shall be permitted for each dwelling unit. Such sign may not contain a commercial message. Such sign shall not be illuminated.
2. Each occupied lot shall be permitted no more than two temporary signs at one time that contain a commercial message, which shall not be illuminated, shall not exceed six and one-half (6.5) sq. ft. in area and shall not exceed five (5) feet in height. The only commercial messages permitted on such signs are messages related to commercial activity lawfully and temporarily conducted on the premises, including the lawful, occasional sale of personal property (such as through a garage sale or a yard sale) or the sale, rental or lease of the

premises. Signs related to the sale of personal property shall be removed within twenty-four (24) hours after the end of the sale. Signs related to the sale, lease or rental of the premises shall be removed no later than four (4) days from the date on which the deed, lease or other document representing the transaction is completed.

§11.7. Signs Permitted for Integrated Business Centers

For integrated business centers, sign area, height, and number of signs shall be in accordance with the standards of this Section.

11.7.1. Freestanding Signs.

1. The number, area and height of freestanding signs shall be in accordance with Table 11.7. Allowable sign height is determined by the maximum sign height permitted in [§11.5.2.1](#) plus the additional height permitted in [Table 11.7](#). Spacing between freestanding signs along the same frontage, where permitted, shall be no less than 200 feet.
2. No freestanding sign shall be built on berms or manmade structures to add height to the sign.
3. Freestanding signs may include message board elements, subject to [§11.5.1](#). The message board shall be considered part of the permitted aggregate freestanding sign area.

11.7.2. Attached Signs. Tenants shall be allowed attached (wall, projecting or awning/canopy) signage complying with [§11.5.3](#) and in accordance with the following:

1. Each ground level tenant space with frontage on the exterior of the building shall be allowed attached signage pursuant to [§11.5.3](#).

Table 11.7 Freestanding Signage for Integrated Business Centers	
GFA of Center	Area, Number and Height of Signs
More than 1,000,000 sq. ft.	Max. aggregate sign area: 1,000 sq. ft. Max. number of signs: 4 Max. area of each sign: 500 sq. ft. Additional height permitted: 25 ft
500,001-1,000,000 sq. ft.	Max. aggregate sign area: 750 sq. ft. Max. number of signs: 3 Max. area of each sign: 400 sq. ft. Additional height permitted: 20 ft
100,000-500,000 sq. ft.	Max. aggregate sign area: 500 sq. ft. Max. number of signs: 1 per street frontage up to 2 total Max. area of each sign: 280 sq. ft. Additional height permitted: 15 ft
50,000-99,999 sq. ft.	Max. aggregate sign area: 320 sq. ft. Max. number of signs: 1 per street frontage up to 2 total Max. area of each sign: 180 sq. ft. Additional height permitted: 10 ft
10,000-49,999 sq. ft.	Max. aggregate sign area: 160 sq. ft. Max. number of signs: 1 per street frontage up to 2 total Max. area of each sign: 100 sq. ft. Additional height permitted: 7.5 ft
Less than 10,000 sq. ft.	Max. aggregate sign area: 100 sq. ft. Max. number of signs: 1 per street frontage up to 2 total Max. area of each sign: 60 sq. ft. Additional height permitted: 5 ft

2. Except as provided for ground floor tenants in Paragraph 1 above, for multi-story buildings, each tenant space with its own exterior public entrance shall be permitted one attached sign.
3. For multi-story buildings in which upper level tenants are accessed through a common, ground level entrance, one attached sign not to exceed twenty (20) sq. ft. in copy area in addition to any other permitted attached signage, shall be permitted at such ground level entrance for building and/or tenant identification.

§11.8. Temporary Signs in Non-residential Districts

Temporary signs shall be allowed in non-residential zoning districts as follows:

- 11.8.1. Applicability. This section shall apply to the following zoning districts: B-1, B-1.2, B-2, B-3, O-1, O-2, Inst-1 and MXD.
- 11.8.2. Temporary Sign Permits. Each temporary sign allowed by this section shall require a temporary sign permit along with a date sticker that must be attached to such temporary sign. Anyone that is required to have a business license in the city must have a current business license at the address where the temporary sign is to be located before a temporary sign permit can be issued. Temporary signs may be permitted only intermittently throughout the year. A permit is required for each sign. No less than thirty (30) days shall pass before the second permit can be issued. In the event a new business is located at the same address, then the new business license holder shall be exempt from the temporary sign permits issued to the previous occupant.
- 11.8.3. General Provisions. Unless specifically provided for otherwise in this Section, the following shall apply to all temporary signs in non-residential districts:
 1. A temporary sign may be a wall sign or a freestanding sign, but shall not be permitted in a public right-of-way.
 2. Duration of Display. Each temporary sign shall not be displayed for more than thirty (30) days in a one year period.
 3. There shall be no more than one temporary sign per address at any one time.
 4. Content. Any sign allowed under this section may contain: any noncommercial message; a commercial message pertaining to goods, services or other commercial transactions available on the premises or that will be available on the premises when construction is complete. Signs seeking employees for a business

shall be considered to pertain to commercial transactions available on the premises and shall be allowed.

11.8.4. Rules for Types of Temporary Signs.

1. Temporary Sign Where Permanent Sign not Installed. For any premises which is occupied or for which a building permit has been issued, and for which the permanent sign allowed by [§11.6](#) or [§11.7](#) has not been installed, one temporary sign shall be allowed from the date of occupancy or the date of issuance of the building permit, whichever comes first, until the date of installation of the permanent sign not to exceed sixty (60) days. The temporary sign shall not exceed the size allowed for the permanent sign or thirty-two (32) sq. ft., whichever is smaller, and, if freestanding, shall not exceed eight (8) feet in height.
2. Grand Opening Banners. Each new non-residential use may have one (1) banner per frontage announcing the opening of the establishment. Such banners shall be limited to an aggregate area of thirty-two (32) sq. ft. per establishment and, if freestanding, shall not exceed eight (8) ft in height. Newly established integrated business centers shall be permitted an aggregate area of forty (40) sq. ft. but shall be limited to one (1) banner per frontage of such center regardless of the number of new uses.
3. Other Temporary Signs. Other temporary signs shall not exceed twenty-four (24) sq. ft. in area and, if detached, shall not exceed six (6) feet in height.
4. Temporary Signs for Non-Profit Organizations. Temporary signs for non-profit 501(c)-3 organizations, such as for charitable fundraising events, that conform to the limitations of this Section shall require a permit as provided in

[§11.8.2](#); however, the permit shall be at no cost. The location, number and size of the signs shall be at the direction of the Mayor. Such signs shall be removed within forty-eight (48) hours following the event. Failure to remove signs in a timely manner may affect issuance of future permits.

§11.9. Nonconforming Conditions

- 11.9.1. Conditions. Any sign that is not specifically permitted, or that does not comply with all provisions of this Ordinance, yet which existed and was maintained as such, as of the effective date of this Ordinance, shall be considered a nonconforming sign.
- 11.9.2. Alterations. A nonconforming sign shall not, after the effective date of this Ordinance, be enlarged, structurally altered, or extended unless such sign shall be made to comply with all the provisions of this Ordinance. Sign faces may be replaced on a nonconforming sign, but no change may be made in the technology of a nonconforming sign unless such sign is made to comply with all of the provisions of this Article.

For purposes of this section, prohibited changes in technology include but are not necessarily limited to: conversion of a single-faced sign to a tri-vision sign; addition of electronic message board technology to a sign; addition of any other form of changeable copy technology – manual, mechanical or electronic – to a sign; conversion from internally lighted to externally lighted or vice versa; or addition of exposed bulbs.

A nonconforming sign may not be replaced by another nonconforming sign. Minor repairs and maintenance of nonconforming signs, such as repainting and electrical repairs, shall be permitted. However, no changes in the location,

size, or shape of any nonconforming sign shall be permitted except to make the sign comply with all provisions of this Ordinance.

- 11.9.3. Compliance. The Department shall require all nonconforming signs to be removed or made to conform to all provisions of this Ordinance, by the owner of the property upon which the sign is located, upon the occurrence of any of the following events:
1. Damage or deterioration of the sign to the extent that the Department Official or its authorized agent determines that the sign is structurally unsound.
 2. Any proposed alteration or repairs to a sign that would prolong the useful life of the sign or that would involve an expenditure of more than fifty (50) percent of the original cost of the sign.
 3. Within ten (10) years from the effective date of this ordinance; or if a business with a nonconforming sign has a written plan on file in the Department to replace the nonconforming sign within fifteen (15) years of the effective date of this ordinance. A written sign replacement plan must include site plan, sign dimensions, sign materials, and location. However, this shall not apply to nonconforming neighborhood signs existing on or prior to the effective date of these regulations. Such nonconforming neighborhood signs shall still be subject to Paragraphs 1 and 2 immediately above.
 4. For any message board on which the message is changed electronically, to achieve compliance with the requirements of [§11.5.1](#) by January 1, 2011.
 5. Where there is any application for a permit for a new or replacement permanent sign on the same site as the

nonconforming sign, except that this provision shall not apply to integrated business centers as defined herein.

§11.10. Legal Status Provisions

- 11.10.1. Generally. If any part, section, subsection, paragraph, subparagraph, sentence, phrase, clause, term, or word of this Article is declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, the declaration of such unconstitutionality shall not affect any other part, section, subsection, paragraph, subparagraph, sentence, phrase, clause, term, or word of this chapter.
- 11.10.2. Severability where less speech results. Without diminishing or limiting in any way the declaration of severability set forth above in §11.10.1, or elsewhere in this Ordinance, if any part, section, subsection, paragraph, subparagraph, sentence, phrase, clause, term or word of this chapter is declared unconstitutional shall not affect any other part, section, subsection, paragraph, subparagraph, sentence, phrase, clause, term or word of this Article, even if such severability would result in a situation where there would be less speech, whether by subjecting previously exempt signs to permitting or otherwise.
- 11.10.3. Severability of provisions pertaining to prohibited signs. Without diminishing or limiting in any way the declaration of severability set forth above in §11.10.1, or elsewhere in this Ordinance, if any part, section, subsection, paragraph, subparagraph, sentence, phrase, clause, term or word of this Article or any other laws declared unconstitutional by valid judgment or decree of any court of competent jurisdiction, the declaration of such unconstitutionality shall not affect any other part, section, subsection,

paragraph, subparagraph, sentence, phrase, clause, term or word of this chapter that pertains to prohibited signs, including specifically those signs and sign types prohibited and not allowed under [§11.4.1](#). Furthermore, if any part, section, subsection, paragraph, subparagraph, sentence, phrase, clause, term or word of this ordinance is declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, the declaration of such unconstitutionality shall not affect any other part, section, subsection, paragraph, subparagraph, sentence, phrase, clause, term or word of this ordinance.

- 11.10.4. Severability of prohibition on off-premise signs. If any part section, subsection, paragraph, subparagraph, sentence, phrase, clause, term or word of this Article and/or any other provisions of this Ordinance are declared invalid or unconstitutional by the valid judgment or decree of any court of competent jurisdiction, the declaration of such unconstitutionality shall not affect the prohibition on off-premise signs as contained herein.

**Article 12 BOARD OF ZONING
ADJUSTMENT**

**§12.1. Powers and Duties of the Board of Zoning
Adjustment**

The Board of Zoning Adjustment, hereinafter referred to as the “BZA”, as prescribed by Code of Alabama, 1975, Section 11-52-80, as amended, shall have the following powers and authority.

§12.2. Administrative Review

The BZA shall have hear and decide appeals where it is alleged that an error exists in any order, requirements, decision or determination made by an administrative official in the enforcement of this Ordinance, in accordance with the following.

- 12.2.1. All appeals shall be filed in writing on forms prescribed by the Board and made available by the Zoning Official. Any such appeal shall be filed with the Zoning Official within fifteen (15) days of the date of the action being appealed. The Zoning Official shall forthwith transmit to the BZA papers constituting the record upon which the action appealed was taken.
- 12.2.2. In exercising the power of administrative review the BZA must apply, not vary, the terms of the Ordinance.
- 12.2.3. An appeal stays all proceedings in furtherance of the action appealed therefrom, unless the Zoning Official certifies to the BZA after the notice of appeal has been filed, that by reason of facts cited in such certification a stay would, in the Zoning Official’s opinion, cause imminent peril to life or property. In such case, proceedings shall not be stayed otherwise than by a restraining order which may be granted by the BZA or by a court of record.

12.2.4. The BZA shall select a reasonable time and place for hearing the appeal. Notice shall be provided in accordance with §12.7 Notice Requirement.

12.2.5. The BZA may affirm, reverse wholly or in part, or modify the Zoning Official’s decision, order, or determination as in its opinion ought to be done, and to that end shall have all the powers of the Zoning Official.

Furthermore, the BZA may classify a use, which is not specifically mentioned, along with a comparable permitted use for purpose of the use regulations of any Zoning District.

§12.3. Special Exceptions

The BZA shall hear and decide requests for approval of Special Exceptions uses in accordance with the following:

- 12.3.1. Special Exception uses shall require the submission of an application to the BZA. Such application shall be filed with the Zoning Official at least thirty (30) days before the scheduled hearing date before the BZA. The application shall be filed by the property owner or their authorized agent on a form made available by the Zoning Official. Notice shall be provided fifteen (15) days in advance and as otherwise in accordance with [§12.7 Notice Requirement](#).
- 12.3.2. The BZA shall review the application for compliance with this Ordinance and all other applicable codes and ordinances of the City. In particular the BZA shall determine that satisfactory provisions have been made concerning the following, among other considerations of this Ordinance:
 1. Access to and from the property and the proposed structure and/or uses, with particular attention to vehicular and pedestrian safety and convenience, traffic flow and control, and emergency access.

2. The location and accessibility of off-street parking and loading areas.
3. The location and accessibility of refuse and service areas and their potentially adverse affects upon surrounding properties.
4. The screening and buffering of potentially adverse views and activities from surrounding properties.
5. Control of noise, glare, odor, surface water runoff, and other potentially disturbing impacts upon surrounding properties.
6. The availability, location, and capacity of utilities.
7. The location and scale of signs and lighting with particular reference to traffic safety, glare, and visual compatibility with surrounding properties.
8. The bulk, density, and lot coverage of structures, and yards and open areas, with reference to their compatibility with the character of the surrounding area.

12.3.3. The Board may impose such conditions for approval that it deems necessary in the particular case to protect the public interest and the intent of the Comprehensive Plan and this Ordinance in relation to the items listed above and as may otherwise be reasonably necessary. Such conditions shall apply to the land, structure, and use for which the Special Exception is granted and not to a particular person. Violations of conditions lawfully attached to any Special Exception shall be deemed to be violations of this Ordinance.

12.3.4. A Special Exception granted by the BZA shall lapse and be of no effect if, after the expiration of one (1) year from the date of such action by the BZA, no construction or change in use pursuant to

such Special Exception has taken place, provided that the BZA may, for good cause shown, specify a longer period of time in conjunction with its action to grant the Special Exception.

§12.4. Variances

The BZA may authorize upon appeal in specific cases such variances from the terms of this Ordinance as will not be contrary to the public interest, where, owing to special conditions, a literal enforcement of the provisions of this Ordinance will result in unnecessary hardship, and so that the spirit of the Ordinance shall be observed and substantial justice done. Such variance may be granted in such individual case of unnecessary hardship upon a finding by the BZA that the conditions outlined below do, in fact, exist. In no case shall the BZA grant a variance that permits the permanent use of land, building or structure for a use prohibited within the district in which the land, building or structure is located. Nor shall the BZA grant a variance, which permits the extension or addition of a non-conforming use or in any way makes a non-conforming use more permanent.

It is the intent of this Ordinance that variances be used only to overcome some physical condition of a parcel of land, which poses a practical difficulty to its development and prevents its owner from using it in conformance with this Ordinance. Any variance granted shall be the minimum adjustment necessary for the reasonable use of the land.

12.4.1. Procedure. Applications shall be filed with the Zoning Official at least thirty (30) days before the scheduled hearing date before the BZA. The property owner or authorized agent shall file the application on a form made available by the Zoning Official. Notice shall be provided fifteen (15) days in advance and

otherwise in accordance with [§12.7 Notice Requirement](#).

- 12.4.2. Before any variance is granted, the BZA must find that *all* of the following conditions exist:
1. There are extraordinary and exceptional conditions, which are peculiar to the piece of property in question because of its size, shape or topography, that are not applicable to other lands or structures in the same district.
 2. Granting the variance requested will not confer upon the applicant any special privileges that are denied to other owners of property in the District in which the property is located.
 3. All literal interpretations of the provisions of this Ordinance would deprive the applicant of rights commonly enjoyed by other owners of property in the district in which the property is located.
 4. The requested variance will be in harmony with the purpose and intent of this Ordinance and will not be injurious to the neighborhood or to the general welfare.
 5. The special circumstances are not the intended result of the actions of the applicant (i.e., self-imposed hardship)
 6. The variance requested is the minimum variance that will make possible the legal use of the land, building or structure.
 7. That no non-conforming use of neighboring lands, structures, or buildings in the same district, and no permitted or non-conforming use of lands, structures, or building in other districts shall be considered grounds for the issuance of a variance.
 8. That the variance will not allow the permanent establishment of a use not permissible under the terms of this

Ordinance in the district involved, or any use expressly or by implication prohibited by the terms of this Ordinance in said district.

- 12.4.3. In proving that an unnecessary hardship has been imposed on the property as a result of the strict interpretation of this Ordinance, the following conditions cannot be considered pertinent to the determination of whether or not an unnecessary hardship exists.

1. Proof that a variance would increase the financial return from the land
2. Personal or economic hardship
3. Self-imposed hardship

In other words, hardship alone is not sufficient to permit variance. It must be an “unnecessary hardship”. Mere financial loss of a kind, which might be common to all of the property owners in a district, is not an “unnecessary hardship”.

- 12.4.4. A Variance granted by the BZA shall lapse and be of no effect if, after the expiration of one (1) year from the date of such action by the BZA, no construction pursuant to such Variance has taken place, provided that the BZA may, for good cause shown, specify a longer period of time in conjunction with its action to grant the Variance.

§12.5. Abatement Order

The BZA may require the conduct of any use, conforming or non-conforming, which results in unreasonable noise, smoke, gas, vibration, fumes, dust, fire, radio interference or explosion hazard or nuisance to surrounding property to be modified or changed to abate such hazard to health, comfort, and convenience. The BZA may direct the Building Official to issue an abatement order, but such order may be directed only after a public hearing by the said Board, notice of

which shall be sent by registered mail to the owners and/or operators of the property in which the use is conducted in addition to due notice by advertisement in a newspaper of general circulation. A hearing to consider issuance of an abatement order shall be held by the BZA either upon petition signed by a person affected by the hazard or nuisance and such order shall specify the date by which the hazard or nuisance shall be abated.

§12.6. Rehearings

12.6.1. All decisions rendered by the BZA shall be final and binding upon all parties. No appeal of an administrative decision, or decision on an application for a variance or a special exception shall be reheard, and no further application shall be accepted once a decision has been rendered except under one or more of the following conditions:

1. New evidence or information pertinent to the request has been discovered which was not available to the applicant at the time of the original hearing.
2. The decision resulted from an error in procedures required by this Ordinance or State law and made by the BZA, the Zoning Official, or any other City Officials.
3. The decision resulted from an error in substantive law under the provisions of this Ordinance or the Code of Alabama, 1975, as amended.

12.6.2. Where no error is alleged and no new evidence is available, a new or more effective presentation by the applicant shall not constitute grounds for rehearing a decision of the BZA. Any applicant wishing a rehearing shall appear before the BZA to present one or more of the qualifying conditions listed in this Section.

12.6.3. If the BZA finds that one or more of the qualifying conditions exist, the applicant may submit a new application. This new application shall be heard at a subsequent BZA meeting, and shall be subject to all regular advertising and procedural requirements. Allowing a new application does not obligate the BZA to grant the request.

§12.7. Notice Requirement

The BZA shall not grant any variance, exception or conduct any other public hearing regarding any other request without first giving written notice a minimum of fifteen (15) days prior to the proposed date of such public hearing to all owners of property located adjacent or contiguous to the boundaries of the property which is subject to the requested variance, exception or other business, as shown by the records of the office of the Tax Assessor of the applicable County on a date not more than ninety (90) days prior to the date of such notice. Such notice shall state the street address of the property, if any, which is the subject of the proposed variance, exception or other request to such proposal and that the said property owner is welcome to attend the public hearing and invited to speak on the issue if he or she so desires. Such notice shall be deemed given when deposited in the United States mail, certified mail-return receipt requested, first class postage prepaid, addressed to such property owners at their addresses as shown on the records of the office of the Tax Assessor of the applicable County on the date such owners are determined. Any error in the address of any notice shall not invalidate the giving of notice, provided that no more than five (5) percent of the total number of notices given with respect to the applicable hearing contain any such error.

§12.8. Appeals from Action of the Board of Adjustment

Any party aggrieved by any final judgment or decision of the BZA may, within fifteen (15) days thereafter appeal there from to the circuit court or court of like jurisdiction, by filing with the BZA a written notice of appeal specifying the judgment or decision from which appeal is taken. In case of such appeal, the BZA shall cause a transcript of the proceedings in the case to be certified to the court to which the appeal is taken and the cause in such court shall be tried *de novo*.

Service of a notice of appeal on the City Clerk by an aggrieved party within the fifteen (15) day appeal time constitutes service on the BZA.

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**Article 13 ADMINISTRATION,
ENFORCEMENT, AMENDMENTS,
PENALTIES**

§13.1. Zoning Official

The Zoning Official is hereby authorized, and it shall be his/her duty to enforce and administer the provisions of this Ordinance. The Zoning Official shall give information upon request as to the provisions of this Ordinance and shall interpret the meaning of the Ordinance in the course of enforcement. This official shall have the right to enter upon any premises at any reasonable time prior to the issuance of a Certificate of Occupancy for the purpose of making inspections of buildings or premises necessary to carry out his/her duties in the enforcement of this Ordinance.

§13.2. Building Permit; Design Review

13.2.1. Building permit required. No building, sign or other structure shall be erected, moved, extended or enlarged, or structurally altered, until the Building Official has issued a Building Permit for such work. The Building Official shall not issue a Building Permit until conformance with the provisions of the Zoning Ordinance is certified by the City Clerk, City Engineer and Fire Marshal. In no case shall a zoning approval be issued for the construction or alteration of a structure not in conformity with the provisions of this Ordinance.

1. The builder or owner shall furnish to the Building Official a foundation survey signed by a Land Surveyor licensed in the State of Alabama prior to the commencement of framing of the building.
2. It shall be unlawful to violate any of this §13.2. Violations shall be remedied in accordance with [§13.7 Remedies and Penalties for Violation](#).

13.2.2. Design review required.

1. For any application related to a non-residential development or landscaping or architectural elements within common areas of residential subdivisions, the Building Official shall not issue any Building Permit until completion of design review as certified by the Design Review Board.
2. Design review applications shall be submitted at least fifteen (15) working days in advance of the next regularly scheduled DRB meeting. The Zoning Official shall submit to the Design Review Board for its review, and thus shall require of the applicant, in addition to any other supporting information as required by this Ordinance, information concerning, as applicable:
 - a. Site Plan, including:
 - (1) location and size of proposed structures, open spaces and parking areas shown in relation to lot lines, adjacent streets, sidewalks, existing buildings, and existing parking areas
 - (2) location and size of proposed accesses to public streets including spacing from adjacent intersections and driveways on abutting properties
 - (3) description of vehicular use areas, including circulation pattern, loading areas, and vehicle stacking space, if applicable
 - (4) location of all proposed and existing sidewalks and other pedestrian facilities on and adjacent to the site
 - (5) location and type of drainage improvements and facilities, including detention or retention basins, shown in relation to lot lines, adjacent streets, sidewalks, buildings, parking areas and open spaces

- b. Architectural Plans, including floor plans, building elevations and proposed façade materials and colors;
- c. the current use and zoning of abutting properties;
- d. Landscaping Plan, including:
 - (1) required landscaping areas with plant materials labeled and shown in relation to lot lines, adjacent streets, buildings and parking areas
 - (2) location, size, function and furnishings for proposed open spaces shown in relation to lot lines, adjacent streets, sidewalks, buildings and parking areas
 - (3) vehicles, equipment, and materials to be stored on the property during construction
 - (4) soil preparation methods, bedding and mulching, and planting details
 - (5) proposed material schedule showing common name, size, spacing, quantity, and installation instructions – differentiating existing and new landscaping
 - (6) proposed screening and buffers, including location of all uses and structures to be screened; and
- e. Lighting Plan, including the location of proposed exterior lighting fixtures shown in relation to lot lines, adjacent streets, sidewalks, existing buildings, parking areas, open spaces, and any existing fixtures on-site or within 50 ft of the site boundary and the height, method of shielding and intensity of proposed exterior lighting fixtures
- f. Signage Plan, including sign locations shown in relation to lot lines, adjacent streets, sidewalks, proposed and existing buildings, and signs within 50 ft of the site boundary and the area, height, design, colors and materials of all proposed signs

§13.3. Conditional Uses

13.3.1. Application. All requests for Conditional Uses shall be submitted on applications made available by the City Clerk. Applications shall be submitted at least twenty-five (25) working days prior to the next regularly scheduled meeting of the Commission and accompanied by maps, drawings, statements and/or other documentation as necessary to determine compliance with the criteria of this [§13.3](#).

13.3.2. Public Hearing. Upon acceptance of an application, the Commission shall consider the application during a public hearing. The Commission shall, after the public hearing, make a recommendation to the Council. Following the recommendation by the Commission, the Council shall hold a public hearing regarding the application and upon completion of said hearing, shall approve with conditions or deny the request within the time limit required by law.

The recommendation by the Commission may be to approve or deny the application, which said recommendation shall be advisory only. Zoning is a legislative matter decided by the Council. The Council shall not be bound by the recommendation of the Commission.

13.3.3. Expiration and Revocation.

- 1. Approval of a Conditional Use shall be considered exercised when the use has been established or when the Building Permit has been issued and substantial construction accomplished. A Conditional Use approval shall lapse and be of no effect if, after the expiration of one (1) year from the date of Council approval, no construction or change in use pursuant to such Conditional Use has taken place, provided that the Council may, for good cause shown, specify a

longer period of time in conjunction with its action to approve a Conditional Use.

2. When such use is abandoned or discontinued for a period of one (1) year, it shall not be reestablished, unless authorized by the Council. Conditional Use approval shall be revoked when the applicant fails to comply with the conditions imposed by the Council.

13.3.4. Determination. Conditional Uses shall only be approved upon a finding that all of the following criteria are satisfied:

1. The use will not, under the circumstances of the particular case, be detrimental to the health, safety or general welfare of the surrounding area.
2. The use is necessary or desirable and provides a service or facility that contributes to the general well-being of the surrounding area.
3. The request is consistent with all applicable provisions of the Comprehensive Plan.
4. The request shall not adversely affect adjacent properties.
5. The request is compatible with the existing or allowable uses of adjacent properties.
6. The request can demonstrate that adequate public facilities, including roads, drainage, potable water, sanitary sewer, and police and fire protection exist or will exist to serve the requested use at the time such facilities are needed.
7. The request can demonstrate adequate provision for maintenance of the use and associated structures.
8. The request has minimized, to the degree possible, adverse effects on the natural environment.
9. The request will not create undue traffic congestion.

10. That such development will comply with all applicable regulations and conditions specified within this Ordinance.

The Council shall describe and have recorded in the minutes, the conditions imposed on the development to assure satisfaction of these criteria.

§13.4. Amendments

The provisions of this Ordinance, including the Zoning map, may from time to time be amended, supplemented, changed, modified, or repealed by the Council in accordance with Alabama Law.

- 13.4.1. Petition to Amend. Petitions to amend this Ordinance with respect to rezoning land may be initiated only upon filing of an application with the Commission by the owner of the land or the owner's authorized agent, in which case a notarized letter is required. Any member of the Council may initiate the rezoning of any land by introduction of a resolution for such purpose. An application for any change of zoning shall be filed in the office of the Commission at least twenty-five (25) working days prior to the next regularly scheduled meeting of the Commission. The petition shall state the nature of the proposed amendment, and a legal description of the property involved and the names and addresses of the owner(s) of the property. No application shall be taken out without descriptive information as to how the petitioner proposes to utilize the parcel of land (plot plan, drawings, sketches, et cetera).

- 13.4.2. Action on Petition. The Commission shall consider the petition at the first regularly scheduled meeting following the proper filing of the petition. The Commission shall, after the public hearing, make recommendations to the Council. The recommendations of the

Commission shall be advisory only, and shall not be binding on the Council. No amendment to the Ordinance shall become effective unless it has been submitted to the Commission for a recommendation.

13.4.3. Notice of Public Hearing. Notice of a public hearing to consider a change in zoning classification must be given to the public as required by Act 1123 of the 1973 Legislature of the State of Alabama and those requirements set forth in the Code of Alabama, 1975. No changes or amendments in the provisions of this Ordinance shall become effective until after a public hearing in relation thereto, at which parties in interest and citizens shall have an opportunity to be heard, in accordance with the following.

1. Petitioner shall furnish City Clerk with names and addresses of owners of record of property within 500 feet, as shown in the records of the Applicable County Tax Assessor.
2. For the purposes of this §13.4.3, the phrase “change in zoning classification” shall include, without limitation, any change, modification or amendment of zoning district boundaries.
3. The Commission shall not conduct any public hearing proposing the recommendation for change in the zoning classification of any property within the City without first giving written notice a minimum of fifteen (15) days prior to the proposed date of the public hearing, to all owners of property located in whole or in part within 500 feet from the boundaries of the property which is the subject of the proposed change in zoning classification, as shown by the records of the office of the applicable County Tax Assessor.
4. The Council shall not enact any change in the zoning classification of any

property subject to the zoning jurisdiction of the City without first giving written notice a minimum of fifteen (15) days prior to the proposed date of such enactment to all owners of property located in whole or in part within 500 feet from the boundaries of the property which is the subject of the proposed change in zoning classification, as shown by the records of the office of the applicable County Tax Assessor on a date not more than one year prior to the date of such notice. Such notice shall state the street address of the property, if any, which is the subject of the proposed change in zoning classification and shall also state that a protest may be filed with respect to such proposed change and that said property owner is welcome to attend the public hearing to speak on the issue if he or she so desires. Such notice shall be deemed given when deposited in the United States mail, first class postage prepaid, addressed to such property owners at their addresses as shown on the records of the office of the applicable County Tax Assessor on the date of such owners are determined. Any error in the address of any such notice shall not invalidate the giving of notice pursuant to this Ordinance, provided that no more than five (5) percent of the total number of notices given with respect to any proposed change in zoning classification contain any such error.

5. For purposes of this Ordinance, the term “written notice by United States mail” shall mean “certified mail-return receipt requested”.

13.4.4. Time Limit. After the Council has voted on an application for rezoning, another application for the same kind of rezoning of the same tract or parcel of land, or change of the same portion of the Zoning Ordinance will not be considered until a period of one (1) year has elapsed from

the date of such action by the Council. Further, a withdrawal of the application for rezoning after hearing held by the Commission, but prior to the hearing by the Council shall also require a one (1) year period of time before another application may be submitted. Provided, however that the Commission and/or Council may adjust this time period if in the opinion of a majority of the Commission and/or Council, an unusual situation or circumstance exists which would warrant another hearing. In other words, the Commission and Council have the discretion to hear rezoning requests at any time when it is determined by the said Commission and/or Council that it will promote the health, safety, morals and general welfare to do so or that there are other justifiable reasons for warranting such rezoning hearing.

13.4.5. Procedures for Creation of Certain Residential Zoning Districts.

1. For applications for rezoning to an R-5, R-7 or R-8 District, the Commission shall consider the preliminary plot plan simultaneously with its recommendation to the Council on the rezoning request as provided herein. For applications for rezoning to an R-9 District, the Commission may consider the preliminary plot plan prior to its recommendation to the Council on the rezoning request.
2. Materials to Accompany Application. An application for rezoning shall be accompanied by a vicinity map and preliminary plot plan as required by the City Subdivision Regulations. For R-9 applications, the following information shall be provided with the preliminary plot plan:
 - a. The location, grouping, and height of all facilities and proposed land uses.

- b. The number of residential units produced, their location, setbacks, building areas (including building areas for covered and uncovered porches, stoops, decks, etc., number of stories, accommodations/requirements for accessory structures for storage, gazebos, etc., indicating those areas to be occupied, buffer areas and details of proposed buffering, and the location and nature of any non-residential uses.
 - c. A preliminary vehicular and pedestrian circulation system, including driveways, walkways, parking areas, and streets to be dedicated.
3. Subject to the applicant's preliminary plot plan (and with any suggested modifications) the Commission shall recommend that the Council approve or disapprove the request.
 4. If the Council approves said rezoning, the applicant shall be generally bound by said preliminary plot plan and all details submitted and presented in the zoning request pursuant to Paragraph 2 above.
 5. Deviations from Approved Preliminary Plot Plan
 - a. Minor changes to the approved preliminary plot plan may be approved by Zoning Official or City Engineer.
 - b. Substantial changes to the approved preliminary plot plan must be approved by the Commission.

§13.5. Zoning of Annexed Property

- 13.5.1. Annexed Property. All territory annexed to the City of Vestavia Hills, Alabama shall be subject to the laws, rules, regulations and ordinances of the said City. All territory annexed to the City shall be zoned in accordance with the following procedure.
- 13.5.2. Jurisdiction over Annexed Property. All territory brought within the corporate

limited of the City by annexation shall be subject to the laws, rules, regulations and ordinances of the City, including specifically but not limited to the Zoning Ordinance, Subdivision Regulations and the City Building Code. The Council shall have and exercise the authority over the territory within the corporate limits of the City.

13.5.3. Authority. Pursuant to the authority vested in the City by the provisions of Title 11-52-70, et seq., Code of Alabama, 1975, the Council shall zone all property annexed to the corporate limits of the City.

13.5.4. Intents and Purpose. In accordance with the provisions of Act Number 300 of the 1955 session of the Alabama Legislature, (Code of Alabama Recompiled, 1958, Appendix Section 985, Volume 14 at page 397), the Council intends to zone and regulate annexed territory as to the kind, character and use and structures and improvements. It is the intent of the Council that all real property located within the municipal boundaries shall be governed by the laws, rules, regulations and ordinances of the City rather than by those of the County.

The City follows the annexation procedure outlined in Act Number 32 of the 1964 session of the Alabama legislature to extend the corporate limits. Said act requires that the municipality shall hold a public hearing to determine the truth of the matters set forth in the Petition for annexation and consider any written protests or objections regarding the proposed annexation. The public hearing on the annexation petition must not be less than ninety (90) days from the date of publication. It is the intent of the Council to conduct a public hearing on the zoning of the annexed territory immediately following the public hearing

on the annexation petition. An ordinance zoning the annexed territory shall be adopted immediately after enactment of the ordinance annexing said property. The terms of this Ordinance however, shall not preclude or prohibit the City from extending its corporate limits in any other way or manner that may now or hereafter be authorized by Alabama Law.

13.5.5. Zoning Classification.

1. The application to zone or rezone the property sought to be annexed shall be initiated by the property owner or the owner's authorized agent by filing a petition concurrently with the petition for annexation. Any member of the Council may also initiate the rezoning of said territory by introduction of resolution for such purposes. The zoning classification to be applied for shall be that Vestavia Hills classification closest to and most compatible with the applicable County classification in effect on the property at the time of filing the petition for annexation except as provided in Paragraph 2 immediately below. Should two different City zoning classifications be close to and compatible with the County classification, then the City classification imposing greater restrictions shall be applied for.
2. A petitioner may request rezoning to a City zoning classification not otherwise compatible with the County zoning classification in effect on the concerned property. In such case, the request shall be considered according to the procedure set forth in [§13.4 Amendments](#). If the request is denied, the Council shall have the authority to classify the property in accordance with Paragraph 1 above. In any case, the property, upon annexation, shall be rezoned to a City zoning classification.

13.5.6. Notice Requirements. Notice shall be in accordance with [§13.4.3 Notice of Public Hearing](#) for other zoning amendments.

§13.6. Temporary Emergency Relief

The Zoning Official upon approval by the Council is hereby granted authority to provide immediate emergency relief to applicants requesting such relief by issuing permits authorizing installation of mobile homes on applicant's property under the following conditions:

- 13.6.1. Such permit shall be temporary and not exceed one (1) year from date of issuance.
- 13.6.2. Such permit shall not be transferable.
- 13.6.3. Prior to issuance of such permit, the Zoning Official shall, with discretion, be reasonably satisfied that the applicant's requested relief is necessary and the need thereof was approximately caused by damage resulting from fire or natural disasters.

§13.7. Remedies and Penalties for Violation

It shall be unlawful to erect, construct, reconstruct, alter, maintain, use or occupy any land in violation of any regulation in, or any provision of this Ordinance, or any amendment thereof, enacted or adopted under the authority of this Act. Any person, firm or corporation violating any such regulation, provision or amendment shall be guilty of a misdemeanor, and upon conviction thereof, shall be punished in accordance with Title 11-45-9, Code of Alabama, for a misdemeanor violation for each such offense. Each and every day during which such illegal erection, construction, reconstruction, alteration, maintenance, use or occupancy continues shall be deemed a separate offense. Provided, however, that prior to any criminal prosecution the Zoning or Building Official or his agent shall give a written notice or citation to the person, firm or corporation

violating any provision of this Ordinance stating the rule or regulation being violated and notifying the said person, firm or corporation to cease and desist such violation immediately, otherwise said person will be prosecuted as provided herein. In case any building or structure is, or is proposed to be erected, constructed, reconstructed, altered, maintained, used or occupied in violation of any regulation or provision of this Ordinance or amendment thereof, enacted or adopted by the City, said Official or any other appropriate authority or any adjacent or neighboring property owner who would be specifically damaged by such violation, may, in addition to other remedies provided by law, institute injunction, mandamus, abatement or any other appropriate action or actions, proceeding or proceedings to prevent, enjoin, abate or remove such unlawful erection, construction, reconstruction, alteration, maintenance, use or occupancy.

The Zoning or Building Official may intervene in any action, suit or other proceedings wherein there is involved any amendment thereof, enacted or adopted by the City. When said Official so intervenes hereunder, that official shall be deemed to be, and shall be treated as an original party to the action, suit or proceedings. It is the intent of this Section that any action, suit or proceedings in which the Zoning or Building Official intervenes shall proceed the same as if that Official has been an original party, insofar as any statute, act or rule prohibiting an entire change in parties is concerned. The provisions of this Section shall apply to any action, suit or proceedings pending at the time of its adoption.

§13.8. Certificate of Occupancy Required

No land or building or other structure or part thereof hereafter erected, moved or altered in its use shall be used until the Building Official, after approval of the Fire Marshal,

shall have issued a Certificate of Occupancy stating that such land or structure or part thereof is found to be in conformity with provisions of this Ordinance.

Within five (5) working days after the owner or his agent has notified the Building Official that a building or premises or part thereof is ready for occupancy or use, it shall be the duty of the Building Official to make a final inspection thereof, and to issue a Certificate of Occupancy if the building or premises or part thereof is found to conform with the provisions of this Ordinance or, if such Certificate is refused, to state the refusal in writing with the cause.

§13.9. Fees

The following requests shall be subject to application fees pursuant to City Ordinance #2342 Schedule of Fees, as amended. All funds collected under the provisions of this Ordinance shall be paid to the City of Vestavia Hills, Alabama.

13.9.1. Requests before the City Council.

1. Rezoning
2. Conditional Use
3. PUD or MXD Master Plan approval

13.9.2. Special Provisions – Rezoning, Conditional Use and PUD Application Fees. The fee and charge shall be retained by the City and shall not be conditioned upon or related to the action taken with respect to said application.

1. In the event of a request for withdrawal or postponement within fifteen (15) working days of a hearing date, there shall be no refund.
2. If a hearing at a later date is desired, an additional fee in the amount of the initial fee shall be charged.

13.9.3. Request before the BZA. The following shall be assessed an application fee for the filing of a request before the BZA.

1. Variance request
2. Special Exception request
3. Other applications to appear before the BZA

13.9.4. Special Provisions, BZA Fees. The fee shall be retained by the City and shall not be conditioned upon or related to the action taken with respect to said applications.

1. In the event of a request for withdrawal or postponement within twenty (20) working days of a hearing date, there shall be no refund of said fees.
2. If a hearing at a later date is desired, an additional fee in the same amount as the initial fee shall be charged.

13.9.5. Design Review Fee. An application fee shall be assessed for each review before the DRB.

13.9.6. Publication and Mailing Expenses. The applicant shall be responsible for publication and mailing expenses necessarily incurred by the City for mailings and publication as required by Alabama law and the terms and provisions of this Ordinance.

13.9.7. Fee Exemptions. The following groups are exempt from all the above application fees, but shall not be exempt from mailing and publication expenses: places of worship, Vestavia Hills City and/or School Board owned properties, properties owned by the County, County School Board, State or Federal Government and projects funded entirely by the City.

Article 14 LEGAL STATUS PROVISIONS

§14.1. Interpretation and Purpose

In their interpretation and application the provisions of this Ordinance shall be considered the minimum requirements adopted for the promotion of the public health, safety, morals, convenience, order, prosperity, and general welfare of the community. Where other ordinances or regulations, which may be adopted hereafter, impose greater restrictions than those specified herein, compliance with such other ordinances or regulations is mandatory. This Ordinance shall not lessen the requirements of plats, deeds, or private contract when such requirements are more restrictive than the provisions of this Ordinance.

§14.2. Savings Clause

If any section, clause, provision, or portion of this Ordinance shall be held to be invalid or unconstitutional by any court of competent jurisdiction, such holding shall not affect any other section, clause, provision or portion of this Ordinance, which is not in and of itself invalid or unconstitutional.

§14.3. Repealing Clause

This Ordinance does not repeal or rescind any other ordinance previously adopted and enacted by the City of Vestavia Hills, which zoned or rezoned property located within the corporate boundaries of the said municipality. To the contrary, any and all previously adopted ordinances which have zoned or rezoned any land within the City of Vestavia Hills be and are hereby reaffirmed.

This Ordinance amends, codifies and republishes the Zoning Code of the City of Vestavia Hills, which provides the kind, character and use of structures and improvements that may be erected or made within the these zoning districts. It does not repeal any portion of the previously enacted

Zoning Code except for those provisions, which are in direct conflict with the terms and provisions of this Ordinance Number 3099.

§14.4. Effective Date

This Ordinance shall become effective immediately upon its approval, adoption and publication as required by law.

APPROVED and ADOPTED this the 23rd _____ day of May, 2022.

Ashley C. Curry Mayor

Attested by:

Rebecca Leavings,
City Clerk

CERTIFICATION:

I, Rebecca H. Leavings, as City Clerk of the City of Vestavia Hills, Alabama, hereby certify that the above and foregoing copy of 1 (one) Ordinance Number 3099 is a true and correct copy of such Ordinance that was duly adopted by the City Council of the City of Vestavia Hills on the 23rd day of May, 2022, as same appears in the official records of said City.

Posted at Vestavia Hills City Hall, Vestavia Hills New Merkel House, and Vestavia Hills Civics Center this the _____ day of _____, 2022.

Rebecca Leavings
City Clerk