Addendum No. 1

Date of Addendum Issuance: November 11th, 2021

Project: Request for Proposals
Professional Engineering Design Services
Wisteria at North Road Intersection Improvements

Subject: Corrections to RFP Format

The following RFP shall replace the RFP posted on November 8th, 2021

SNELLVILLE

Request for Proposals

Professional Engineering Design Services
For
Wisteria Road at North Road Intersection Improvements

Issuance Date of RFP: November 8th, 2021

Deadline for Proposal Submittal: December 6th, 2021 (3:00PM)

Professional Engineering Design Services
For
Wisteria Road at North Road Intersection Improvement Project

The City of Snellville is seeking proposals from qualified civil engineering design firms for the following scope of work: "Provide engineering design, environmental and utility permitting, right-of-way plans, surveying, construction plans/specifications and related services for the "Wisteria Road at North Road Intersection Improvements".

Project is funded through the City SPLOST program. The firm to perform right-of-way acquisition and administration will be selected by the City at a later date TBD. Although no federal funding is anticipated to be utilized on this project and adherence to the PDP process is not required, the City will expect the same level of quality and attention to detail. State funding may be pursued at a future date.

The City will receive technical proposals until 3:00 PM; December 6th, 2021 at City of Snellville, 2342 Oak Road, Snellville, Georgia 30078; ATTN: Butch Sanders, City Manager. Technical proposals received after that time and date will not be accepted. Technical proposals are to submitted in an enclosed & sealed envelope and on the face of the envelope the following shall be shown:

City of Snellville
2342 Oak Road
Snellville, GA 30078
"Wisteria Road at North Road Intersection Improvement"
Bids Due: December 6th, 2021; 3:00 PM
ATTN: City Manager Butch Sanders

Electronic submissions will not be accepted. The process for selection of engineering firms will be primarily Qualification-Based Selection (QBS). Only technical proposals are to be submitted at this time. A Selection Committee will identify the short-listed firms. These firms may be required to attend an interview, present schematic plan(s) of their respective streetscape approach. A Sealed fee proposal will be requested from the short-listed firms.

There will be a **non-mandatory** pre-proposal meeting on November 19th, 2021 at 1:00 PM at Snellville City Hall; 2342 Oak Road, 2nd floor conference room.

The Request for Proposal (RFP) is available on the City web site; www.Snellville.org. Addenda to this proposal, if any, including any responses to questions, will be posted on the City web site. Questions regarding this RFP shall be addressed to the cities Project Engineer, Larry Kaiser, P.E. at kaiser@co-infra-services.com. No contact, other than through emails with Larry Kaiser for purposes of questions or clarifications regarding the RFP, shall occur with staff, administration or elected officials with the City of Snellville regarding this project. Any form of contact may result in disqualification from submittal of this RFP.

The City of Snellville reserves the right to reject any or all proposals, to waive technical or legal deficiencies, and to accept any proposal that it deems to be in the best interest of the City.

GDOT pre-Qualified Disadvantaged Business Enterprise (DBE) and Woman Business Enterprise (WBE) firms are encouraged to apply. City of Snellville's DBE goal is 12% Disadvantaged Business Enterprises Participation. Any selection made as a result of this notice will be made without regard to race, color, religion, sex, or national origin. The selected firm will be required to comply with all Equal Employment Opportunity (EEO) laws and regulations, including nondiscrimination under Title VI of the Civil Rights Act. The City of Snellville is an Equal Opportunity Employer.

City of Snellville Request for Proposals

INVITATION

The City of Snellville is now accepting proposals for qualified professional service providers to provide professional engineering design services. Technical Proposals are to be mailed or delivered in person to City Manager Butch Sanders **until 3:00PM (EST) on December 6th, 2021.** Proposals will be considered from any professional firm, including sub-consultants, with experience and success in providing professional engineering services for local government and who are GDOT pre-qualified in the following Area Class categories: 1.06 (a) thru (f), 1.09, 1.10, 3.01, 3.02, 3.03, 3.06, 3.07, 3.09, 3.10, 3.12, 3.13, 3.15, 5.01, 5.02, 5.03, 5.04,5.05,5.06,5.07,5.08, 6.03 and 9.01. The Brooks Act (qualifications-based selection process) will be used to determine the highest ranked firm for purposes of fee negotiations.

Proposed Schedule	
Release of RFP	November 8th. 2021
Pre-Proposal Conference	November 19th, 2021; 1:00 PM
Deadline for Questions	November 24th, 2021; 5:00 PM
Deadline for City Response(s) To Questions and/or Addendum(s)Posted	November 25th, 2021; 5:00 PM
Deadline for Proposals	December 6th, 2021; 3:00 PM
Interviews (if applicable) with Short-Listed Firms	December 7th – 9th, 2021
Scope & Fee Negotiations with Highest Ranked Firm	December 9th – 10th, 2021
City Council Work Session & Council Meeting Staff Presentation – Highest Ranked Firm & Fee	December 2021 or January 2022
Award	December 2021 or January 2022
Proposed Notice to Proceed	January 2022

Any questions shall be submitted via email to Larry Kaiser, kaiser@co-infra-services.com. Subject line of email shall be as follows:

Wisteria @ North Intersection Improvement Project

PRE-PROPOSAL CONFERENCE MEETING:

The City will hold an in-person non-mandatory pre-proposal meeting on November 19th, 2021 at 1:00 PM (EST).

1.0 ENGINEERING FIRM QUALIFICATIONS – FUNDING – DATE FOR PLAN COMPLETION

The City of Snellville desires to select a GDOT pre-qualified engineering firm to prepare a set of construction, utility and right-of-way plans. The plans shall be in accordance with Gwinnet County Transportation Department's Plan Development Process. Refer to Exhibit D. The City and Gwinnett County shall review the plans at various stages of development as noted in the subsequent section of this RFP. Gwinnett County shall provide final approval of the plans (PE, ROW and Utility plans).

The City will utilize 100% local funds (SPLOST) to fund PE, environmental, utility permitting, ROW Acquisition and Construction phases.

The city will expect that a final biddable plan set be completed and available for the city to advertise-to-bid by no later than April 1st, 2023.

2.0 PROBLEM STATEMENT

Traffic generated from the Grove at Towne Center project is anticipated to impact a number of intersections that are adjacent to the development project. Although this RFP only intends to address improvements at the Wisteria and North Road intersection, the City will require a comprehensive traffic study and associated modeling that evaluates the effects of adjoining signalized and un-signalized intersections at the following adjoining intersections:

- ✓ Oak and North Road intersection
- ✓ Oak and SR 124 intersection
- ✓ SR 124 at Wisteria intersection

The results of this modeling effort may result in modifications to the schematic plan shown in Exhibit A, including future transportation improvements at the locations identified in the aforementioned. Any future transportation improvements that result from this modeling effort will need to be identified in concept only. The attached Exhibits B and C provide the proposers with documentation on the Grove at Town Center DRI and the currently advertised Invitation-to-Bid "Town Center Roadway Improvements".

3.0 EXISTING CONDITIONS

Existing conditions within the limits of work are described as follows:

- ➢ Field observations indicate significant delays exist in the southbound movement on North Road at the intersection throughout the day with more significant delays in the PM Peak. No left turn lane exists on North Road. The queuing length on North Road southbound at the intersection has been measured at 800 feet and routinely between 400-500 feet during the peak hours and 200-300 feet in the off-peak.
- ➢ Westbound Wisteria Road PM and AM peak hour field observations reflect delays for vehicular turning movements onto North Road northbound

- For Wisteria Road eastbound movements, the left turn lane storage capacity is often exceeded in the PM peak hours. This results in conflicts with the Wisteria Road eastbound thorough movement

4.0 PROPOSED IMPROVEMENTS

Based on many years of field observations, the City has identified the following potential improvements with the understanding that the traffic study and warrants analysis will determine the final intersection layout:

- With North Road to be converted from a one-way to a two-way facility as part of the Grove at Towne Center Development project, the city anticipates a need for a left turn lane northbound on North Road at the intersection. The 750 space parking deck entrance/exit is located on North Road and the anticipated traffic volumes will likely necessitate this left turn lane movement onto Wisteria Road westbound
- A left turn lane on North Road southbound for eastbound Wisteria Road turning movements
- A left turn lane southbound on North Rd for left turn movements into the Grove at Towne Center parking deck
- A right turn lane westbound on Wisteria Road at North Road
- Maintain the existing left turn and thru lane on Wisteria Rd westbound
- A right turn lane, a thru lane and a left turn lane on Wisteria eastbound at North Road

Other project scope elements shall include the following:

(a) Sidewalks on the west side of North Rd within the project limits
(b) New signal pole uprights and mast arms
(c) Retaining wall to have a decorative façade – similar to the texture and color of the structures located within the Grove at Towne Center development
(d) Street and pedestrian lighting
(e) Landscaping including trees where appropriate

5.0 SCOPE OF SERVICES

The City of Snellville seeks to select a design consulting firm or a team of consultants to provide professional engineering design services, surveying, and environmental and utility permitting and a biddable set of construction plans.

Each phase of plan development will be reviewed by the City and Gwinnett County. The plan development will be in accordance with Gwinnett County Transportation Department’s Plan Development Process. Gwinnett County will provide the final approval of the plan set.

The City will develop a scope of work and select a firm for Right-of-Way Administration and Acquisition Services, on this project as a separate contract.

Engineering, Environmental and Surveying Services provided under the contract will be for the following tasks:

Task 1: Public Involvement

- One Concept meeting including handouts, displays and response to questions from the public. Meeting to occur in-person
- One Preliminary Plan Meeting (with draft ROW plans included) including handouts, displays and response to questions from the public. Meeting to occur in-person

Task 2: Database Preparation – In compliance with the Gwinnett County Department of Transportation's Design Policies and Plan Development processes, provide detailed survey including the existing right-of-way, edge of pavement, curb & gutter, sidewalk, utilities (above ground and utility markings), and any potential impacts in the vicinity of the project such as trees, walls, paths, etc. Topographic data collected shall be sufficient for 2-foot intervals. Include property database.

Task 3: Environmental – No environmental work is anticipated. Given the existing development coverage and development currently under construction within the project limits, the City anticipates no environmental resources exist at this project location.

Task 4: Engineering Design – Prepare Roadway Plans, in compliance with the Gwinnett County Department of Transportation Design Policies and Plan Development Process. Final Construction Drawings consisting of, but not limited to, the following:

a. Cover Sheet
b. Index Sheet
c. General Notes
d. Typical Roadway Sections showing full pavement design and overlay where applicable.
e. Roadway Plans and Profiles, including the layout of all geometric and drainage improvements and depiction of all necessary rights-of-way and easements. Right-of-way may be shown on the construction plans to minimize sheets.
f. Drainage Profiles
g. Preliminary Stormwater Management/Infeasibility Evaluation
h. Traffic Marking and Signing Plans (can be included on construction plans)
i. Utility Plans and Coordination. All located existing utilities will be shown as a part of the plan set.
j. Electrical design for lighting of the signalized intersections. The design shall include drawings and technical specifications that includes a photometric layout that is in compliance with Gwinnett County standards and Walton EMC electrical service, lighting, lighting controls and circuitry, quantities and cost estimates. This includes roadway and pedestrian lighting within the project limits.
k. Roadway Cross Sections and Grading Plan
l. Erosion and Sedimentation Control Plans
m. Traffic Signal Plan including the addition of mast arm poles
n. Detailed construction cost estimates to be provided in the concept, PFPR and FFPR phases
o. Design Variances (if applicable)
p. Address all plan review comments from the City and County

Task 5: Right-of-Way – Right-of-way plans including individual parcel plats and legal descriptions of required fee simple right-of-way, temporary and permanent easements. Written legal descriptions shall also be provided.

Task 6: Meeting Attendance - The Consultant will budget (at a minimum) attendance at the following meetings over the duration of the project:

- 1 kick-off meeting with the City project engineer, city administration and County Transportation staff
- 20 meetings with 10 of those meetings face-to-face over the duration of the project; including a meeting summary at the conclusion of each meeting
- 2 presentations to City council (face-to-face)
- 2 public/community meetings (assume in-person Cafeteria Style meetings). Other forms of communication & outreach to be recommended by the proposer depending on COVID conditions)

Project Oversight and Staffing

The successful offeror will report to City Manager Butch Sanders; bsanders@snellville.org for non-technical and city administrative matters. Project Engineer Larry Kaiser; Kaiser@co-infra-services.com, will be the contact on technical issues.

Gwinnett County to be copied on all matters related to the project schedule or technical matters.

6.0 RFP STANDARD INFORMATION

6.1 Authority

This RFP is issued under the authority of the Purchasing Division of the City of Snellville. The RFP process is a procurement option allowing the award to be based on stated evaluation criteria. **A modified version of the Brooks Act will be utilized on this project.** The RFP states the relative importance of all evaluation criteria. No other evaluation criteria, other than as outlined in the RFP, will be used.

6.2 Offeror Competition

The City encourages free and open competition among offerors. Whenever possible, the City will prepare documents and conditions to accomplish this objective, consistent with the necessity to satisfy the City's need to procure technically sound and cost-effective services.

6.3 Receipt of Proposals and Public Inspection

6.3.1 Public Information

All information received in response to this RFP, including copyrighted material, is deemed public information and will be made available for public viewing and copying shortly after the time for receipt of Proposals has passed with the following four exceptions: (1) bona fide trade secrets meeting confidentiality requirements that have been properly marked, separated and documented; (2) matters involving individual safety as determined by the City of Snellville (3) any company financial information requested by the City of Snellville to determine consultant responsibility, unless prior written consent has been given by the offeror; and (4) other constitutional protections.

6.3.2 Procurement Officer Review of Proposals

Upon opening the Proposals received in response to this RFP, the procurement officer in charge of the solicitation will review the Proposals and separate out any information that meets the referenced exceptions in Section 2.3.1 above, providing the following conditions have been met:

- Confidential information is clearly marked and separated from the rest of the Proposals.
- An affidavit from an offeror's legal counsel attesting to and explaining the validity of the trade secret claim is attached to each Proposal containing trade secrets.

Information separated out under this process will be available for review only by the procurement officer, the evaluation committee members, and limited other designees. Offerors must be prepared to pay all legal costs and fees associated with defending a claim for confidentiality in the event of a "right to know" (open records) request from another party.

6.4 Classification and Evaluation of Proposals

6.4.1 Initial Classification of Proposals as Responsive or Non-responsive

All Proposals will initially be classified as either "responsive" or "non-responsive". Proposals may be found non-responsive any time during the evaluation process or contract negotiation if any of the required information is not provided; the submitted price is found to be excessive or inadequate as measured by criteria stated in the RFP; or if any requirements stated in the RFP are absent in the Proposal. If a Proposal is found to be non-responsive, it will not be considered further.

6.4.2 Determination of Responsibility

The procurement officer will determine whether an offeror has met the standards of responsibility. Such a determination may be made at any time during the evaluation process and through contract negotiation if information surfaces that would result in a determination of non-responsibility. If an offeror is found non-responsible, the determination must be in writing, made a part of the procurement file and mailed to the affected offeror.

6.4.3 Evaluation of Proposals

All responsive Proposals will be evaluated based on stated evaluation criteria. In scoring against stated criteria, the City may consider such factors as accepted industry standards and a comparative evaluation of all other qualified RFP responses in terms of references, satisfaction of the required criteria, etc. These scores will be used to determine the most advantageous offering to the City.

6.4.4 Completeness of Proposals

Selection and award will be based on the offeror's Proposals and other items outlined in this RFP. Submitted responses may not include references to information located elsewhere, such as Internet websites or libraries, unless specifically requested. Information or materials presented by offerors outside the formal response or subsequent discussion/negotiation or "best and final offer," if requested, will not be considered, will have no bearing on any award, and may result in the offeror being disqualified from further consideration.

6.5 City's Rights Reserved

Issuance of the RFP in no way constitutes a commitment by the City of Snellville to award and execute a contract. Upon a determination such actions would be in its best interest, the City, in its sole discretion, reserves the right to:

- cancel or terminate this RFP;
- reject any or all Proposals received in response to this RFP;
- waive any undesirable, inconsequential, or inconsistent provisions of this RFP which would not have significant impact on any Proposal;
- not award if it is in the best interest of the City not to proceed with contract execution; or
- if awarded, terminate any contract if the City determines adequate City funds are not available.

6.6 General Information

1. It is extremely important that project schedules are met. Only those firms or teams with the necessary resources and a commitment to complete all work on schedule should submit a Proposal.

2. Firms are expected to be knowledgeable of Gwinnett County's Design Policies and Plan Development Process.

3. Consultant must be pre-qualified for work with Georgia Department of Transportation in the following Area Classifications: 1.06 (a) thru (f), 1.09, 1.10, 3.01, 3.02, 3.03, 3.06, 3.07, 3.09, 3.10, 3.12, 3.13, 3.15, 5.01, 5.02, 5.03, 5.04,5.05,5.06,5.07,5.08, 6.03 and 9.01.

4. City of Snellville will expect to liaison with a single project manager representing the prime consultant firm and the sub-consultants.

5. The City may select the best qualified consultant based on the information received from interested firms as a result of this solicitation. If necessary, interviews will be held.

6. City of Snellville reserves the right to cancel any and all Request for Proposals at any time when it is determined to be in the best interest of the City.

7. City of Snellville also reserves the right to increase, reduce, add or delete any task or item in this solicitation as deemed necessary.

8. City of Snellville will require a minimum 12% Disadvantaged Business Enterprises Participation. DBE firms should be pre-qualified with the Georgia Department of Transportation. Any selection made as a result of this notice will be made without regard to race, color, religion, sex, or national origin.

9. City of Snellville anticipates issuing a Notice-to-Proceed for each task based on the

proposal to be awarded as a result of this advertisement.

10. Generally, the City's position is **not** to provide Debriefings until after the contract has been awarded, except for firms disqualified during the Due Diligence Process, in which case a **Pre-Award Debriefing** can be requested following Due Diligence. For these contracts, pre-award debriefings would be provided after the announcement of the short-listed firms. Requested debriefings will only occur within 30 days after consultant contract award occurs with City Council. **All requests must be made and scheduled within this time frame.**

11. It is the responsibility of all firms interested in submitting proposals for this advertisement to routinely check the posting on the website for any revisions to this RFP.

12. Incomplete submittals will not be considered. Late submittals will not be accepted.

7.0 PROPOSALS SUBMISSION AND EVALUATION

7.1 Process for Submitting Proposals

7.1.1 Preparation of Proposals

Each Proposal should be prepared simply and economically, avoiding the use of elaborate promotional materials beyond those sufficient to provide a complete presentation. If supplemental materials are a necessary part of the technical Proposals, the Offeror should reference these materials in the technical Proposals, identifying the document(s) and citing the appropriate section and page(s) to be reviewed.

7.1.2 Packaging of Proposals

The Offeror's Technical Submission is to be submitted via US Post Office or other mail carrier to electronically to City Manager Butch Sanders; bsanders@snellville.org; no later than 3:00 PM; December 3rd, 2021.

The face of the sealed envelope shall clearly sate the following – "RFP for Professional Engineering Services - Wisteria Road at North Road Intersection Improvements".
Proposal received after the due date and time will not be evaluated.

Fee proposals will NOT be accepted at this time.

7.1.3 Number of Proposal Copies

Three hard copies of the technical proposal shall be included in the sealed envelope and the proposal included on a thumb drive.

7.1.4 Acknowledgment of Addendum and/or Response to Questions

Included in the submitted proposal shall be an acknowledgement (listing) of all Addendum and/or Response to Questions.

7.2 Evaluation Process

The Selection process is primarily based on the technical skills, experience and satisfying the requirements set forth in the RFP. The interview process, if utilized, will be scored as part of the technical assessment.

All responsive Proposals will be evaluated based on stated evaluation criteria. In scoring against stated criteria, the City may consider such factors as accepted industry standards and a comparative evaluation of all other qualified RFP responses in terms of differing price, quality, and contractual factors. These scores will be used to determine the most advantageous offering to the City. Only those that meet the evaluation criteria will be considered as pre-qualified. **The City will adhere to a modified version of the Brooks Act in the selection for the design professional where fees are a small percentage of the overall evaluation.**

7.2.1 Administrative Review

The Proposals will be reviewed by the Issuing Officer for the following administrative requirements:

1. Submitted by deadline

2. Technical Submission of Proposals

3. All required documents have been submitted

4. All documents requiring an original signature have been signed and are included electronically

7.2.2 Mandatory Requirements Review

Proposals which pass the administrative review will then be reviewed by the Technical Evaluation Team to ensure all requirements identified in Section 3.0 are addressed satisfactorily. The Technical Evaluation Team will consist of the city consultant and city administrative staff.

The Selection process is Qualification-Based where the technical skills, experience and the interview process are the most significant components of the evaluation process. The following outlines the process to be utilized by the Recommendation Committee.

1. The Recommendation Committee will review the Technical Proposals of the firms who submit for this project
2. The highest ranked technical proposals (no defined number) will be defined as the “short list”
3. The “short-listed” firms will be notified by Recommendation Committee. The “short-listed” firms will be provided a date and time in which to appear for an interview; if

requested to do so by the city. The "short-listed" firms will be given specific direction as the information expected of the firms if a presentation is held. The Interview Team will desire to interview the Project Manager, the responsible staff person for the sub-Consultants, etc. The Short-Listed firms are encouraged to bring any data, information, visuals, etc. that will present their case for being selected.

4. Following the interviews, the Technical Evaluation Team will score the firm's performance from 0 to 100. The scores from the interview (if an interview is undertaken) will be added to the technical proposal score. Fee proposals from the short-listed firms will then be requested and added to the technical and interview scores. The rankings of the short-listed firms and the Recommendation Team's "highest ranked firm" will be presented to City Council for approval. City Council has the final authority for selection of the highest ranked firm.
5. Once the ranking is identified and confirmed by the City, fee and scope negotiations will commence immediately with the selected firm.
6. Negotiation of the terms, conditions, scope and fees related to the contract for design services shall be limited to three (3) days following the commencement of negotiations. If an agreement cannot be reached within that time frame, negotiations with the next top-ranked short-listed firm.

7.2.3 Technical Proposals Evaluation

In this phase, the Evaluation Committee will evaluate the quality and completeness of each technical submittal as it addresses each requirement of the RFP. The RFP carries a total weight of **100 points**. Technical submittals will be evaluated and scored in categories. Each category is assigned a maximum point value. Technical submittals must receive at least 75 points (75%) to be further evaluated.

Firms will be evaluated and rated based on the criteria below (listed by relative importance, in descending order):

A. Proposals of Design Team (30%)

- Proposals of the design team members.
- Demonstrated experience and reputation of project manager in the management of similar type projects.
- Knowledge of current design criteria (AASHTO Guidelines Gwinnett County Design Policies, MUTCD, and other industry standards).
- QA/QC procedures

B. Past experience of the Design Team (30%)

- Demonstrated experience with similar type of projects
- Demonstrated ability to complete multiple projects for municipal clients in a timely manner
- References

C. Demonstrated understanding of the project scope and other relevant issues (30%).

D. Interview and Fees (10%)

- If an interview is required, the interview process will account for 5% with 5% assigned to the fee. If the interview does not occur, the fee will account for 10% of the overall evaluation.

7.2.4 Site Visits and Oral Presentations

The City reserves the right to conduct site visits or to invite Offerors to present their technical solution to the Technical Evaluation Team.

7.2.5 Submittal Requirements

Failure to meet these requirements will result in the Proposals being determined "non-responsive" and the entire submittal will be rejected.

Proposals shall include the following information in the order detailed:

Title Page: List the RFP subject, the name of the firm including all proposed sub-consultants, name of contact person and the date.
Table of Contents: Include a clear identification of the material included in the proposal by page number
Letter of Transmittal: Limited to 2 pages. Express a commitment to perform the required work within the time frame identified in the aforementioned. If time frame is not feasible, explain why and provide rationale. Also give the name (s) of the person (s) who will be authorized to represent the firm, their title and telephone number (cell and office).
Statement of Qualifications of Project Team:

A. Name, address and telephone numbers (cell and office) of the lead firm's owner (s) and full information about the corporate structure of the submitting lead firm including financials and/or audit of the firm's financials **(3 pages maximum)**

B. Location of the firm's primary place of business for legal purposes and any subsidiary offices, years of business and types of services offered **(1 page maximum)**

C. Names and qualifications of personnel to be assigned to the project design **(no maximum).** Include an organizational chart. The organizational chart shall be single-sided and shall not exceed 11" x 17" in size.

D. List of **all** projects done for city/county entities or state/federal agencies in the State of Georgia in the past two (2) years that are relevant/similar to this project.

E. The Project Manager assigned to this project shall be identified and a description of his/her relevant previous/present projects listed. This includes a list of past relevant projects, which proposed project staff have played a central role in designing shall also be provided **(2 pages maximum).**

F. Current and projected workload of assigned Project Manager and supporting staff (specifically the traffic engineering consultant and the environmental consultant) shall be identified including the percentage of time assigned to this project. **(1 page maximum).**

G. A list of all lawsuits in which the lead firm and sub-consultants have been involved in over the past five (5) years including all settlements or arbitrations **(no maximum)**

H. Identify the DBE firm (s) and the percentage of the contract amount assigned to these firms. **Do NOT identify the dollar amount.** Document firms are GDOT pre-qualified and provide verification as such.

Statement of Project Understanding and Approach: The consultant shall state in succinct terms their understanding of what is required by the Scope of Work, including providing a narrative of the consultant's approach and technical plan for accomplishing the work herein. The consultant is encouraged to elaborate and improve on the tasks listed in the RFP. Specific illustrations of former or current design projects similar to this project shall be submitted and why your firm's past experiences are relevant to the city hiring your firm **(5 pages maximum)**

Time Schedule: The Consultant shall state whether the City's Proposed Schedule is workable and if not, explain why including your proposed revised schedule. The ability to submit a final set of approved plans prior to April 2023 will be reviewed favorably by the city. **(1 page maximum)**

Intangibles: The Consultant may include any other information that they believe will strengthen their position as the firm of chose **(2 pages maximum)**

7.3 Rejection of Proposals/Cancellation of RFP

The City reserves the right to reject any or Proposals, to waive any irregularity or informality in a Proposal, and to accept or reject any item or combination of items, when to do so would be to the advantage of the City. It is also within the right of the City to reject Proposals that do not contain all elements and information requested in this document. The City reserves the right to cancel this RFP at any time. The City will not be liable for any cost/losses incurred by the Offerors throughout this process.

7.4 City's Right to Investigate and Reject

The City may make such investigations as deemed necessary to determine the ability of the offeror to provide the supplies and/or perform the services specified.

7.4.1 Offeror Informational Requirements

In determining the capabilities of an offeror to perform the services specified herein, the following informational requirements must be met by the offeror. (Note: Each item must be thoroughly addressed. Offerors taking exception to any requirements listed in this section may be found non-responsive or be subject to point deductions.)

7.4.1.2 Resumes/Company Profile and Experience

Offeror shall specify how long the individual/company submitting the Proposal has been in the business of providing services similar to those requested in this RFP and under what company name. A resume or summary of Proposals, work experience, education, skills, etc., which emphasizes previous experience in this area should be provided for all key personnel who will be involved with any aspects of the contract.

7.4.1.4 Offeror Financial Stability

Offerors shall demonstrate their financial stability to supply, install and support the services specified by: (1) providing financial statements, preferably audited, for the 2 (two) consecutive years immediately preceding the issuance of this RFP, and (2) providing copies of any quarterly financial statements that have been prepared since the end of the period reported by your most recent annual report.

8.0 TERMS AND CONDITIONS

8.1 RFP Amendments

The City reserves the right to amend this RFP prior to the due date. All amendments and additional information will be posted to the City's website at: www.Snellvillega.gov. Offerors are encouraged to check this website frequently for any RFP updates.

8.2 Proposal Withdrawal

A submitted Proposal may be withdrawn prior to the due date by a written request to the City Manager. A request to withdraw a Proposals must be signed by an authorized individual.

8.3 Cost for Preparing Proposals

The cost for developing the Proposal is the sole responsibility of the Offeror. The City will not provide reimbursement for such costs.

8.4 Term

The term of this contract shall for fifteen (15) months from the beginning date, or such shorter time as may be indicated on the bid document and all orders issued and postmarked by the Department during said term shall be filled at the contract price. If selected to submit a fee, hourly rates and any escalation of said rates over the term of the contract will be negotiated.

8.5 Conflict of Interest

If an Offeror has any existing client relationship that involves the City of Snellville, the Offeror must disclose each relationship.

8.6 Minority Business Policy

It is the policy of the City of Snellville that minority business enterprises shall have a fair and equal opportunity to participate in the City purchasing process. Therefore, the City of Snellville encourages all minority business enterprises to compete for, win, and receive contracts for goods, services, and construction. Also, the City encourages all companies to sub-contract portions of any City contract to minority business enterprises.
The DBE minimum goal for this project is 12 percent.

8.7 ADA Guidelines

The City of Snellville adheres to the guidelines set forth in the Americans with Disabilities Act. Offerors should contact the Issuing Officer at least one day in advance if they require special arrangements when attending the Offeror's Conference, if any.

The Georgia Relay Center at 1-800-255-0126 (TDD Only) or 1-800-255-0135 (Voice) will relay messages, in strict confidence, for the speech and hearing impaired.

8.8 Compliance with Laws

The Contractor will comply with all City, State of Georgia, Title VI and Federal laws, rules, and regulations.

8.9 Governing Terms

This RFP expressly limits acceptance to the terms stated below. Any additional or different terms proposed by Contractor ("Consultant") and expressed in any form (acknowledgements, confirmations, invoices, catalogs, brochures, technical data sheets, etc.), whether before or after Contractor's receipt of this contract, shall not be binding upon City. City's silence or acceptance of the Materials shall not constitute consent to such additional or different terms.

8.10 Indemnification

Contractor shall be responsible for and shall indemnify and hold City harmless from any and all claims, demands, costs, damages and expenses of whatever nature (including, without limitation, attorney's fees) relating to or arising from (a) Contractor's breach of any of the representations and warranties contained herein; (b) Contractor's failure to follow City's specifications; (c) Contractor's other breach of the terms hereof; or (d) any other act(s) or omissions(s) of Contractor, its employees, independent contractors, agents, and suppliers, but only to the extent caused by or resulting from the negligence, recklessness, or intentionally wrongful conduct of the Contractor or other persons employed or utilized by the Contractor in the performance of the contract.

8.11 Corrections/Credits

At City's option, Contractor shall either issue an appropriate credit or undertake, at Contractor's sole cost, corrections to materials made necessary by reason of Contractor's failure to follow City's specifications or Contractor's other breach of the terms hereof. The remedies afforded City in this paragraph are in addition to, not in lieu of, any other remedy herein or provided by law or equity.

8.12 Insurance

Contractor shall maintain the following insurance (a) comprehensive general liability, including blanket contractual, covering bodily injuries with limits of no less than $1,000,000.00 per person and $1,000,000.00 per occurrence, and property damage with limits of no less than $1,000,000.00 per occurrence; and (b) statutory worker's compensation insurance, including employer's liability insurance. In addition to above general coverages, contractor shall maintain Professional Liability Insurance with limits of $2,000,000 per occurrence and in aggregate. All insurance shall be provided by an insurer(s) acceptable to City, and shall provide for thirty (30) days prior notice of cancellation to City. Upon request, Contractor shall deliver to City a certificate or policy of insurance evidencing Contractor's compliance with this paragraph. Contractor shall abide by all terms and conditions of the insurance and shall do nothing to impair or invalidate the coverage. Gwinnett County shall be named as "additional insured".

8.13 Cancellation

City may cancel this agreement at any time prior to City's acceptance of the Services, upon giving written notice of cancellation to Contractor. In such event, in lieu of the price(s) specified on the reverse hereof, Contractor shall be entitled only to payment of the direct non-cancelable costs theretofore incurred by Contractor and any direct non-cancelable committed costs theretofore committed by Contractor, as directly relating to the performance of Contractor's obligations hereunder prior to such cancellation; provided, however, the total amount of such costs shall not exceed the price(s) specified on the reverse side. City shall not be responsible for any other amounts whatsoever including, without limitation, penalties.

8.14 Independent Contractor

Contractor shall at all times be acting as an independent contractor and not be considered or deemed to be an agent, employee, joint venture or partner of City. Contractor shall have no authority to contract for or bind City in any manner.

8.15 No Assignment

Contractor may not assign this agreement or any of its rights or responsibilities hereunder, without City's prior written consent.

8.16 Audit

Upon not less than two (2) days prior notice, City shall have the right to inspect and audit all records (including, without limitation, financial records) of Contractor which pertain to Contractor's fulfillment of this agreement and charge therefore.

8.17 Attorney's Fees

In the event of Contractor's breach hereunder, City, in addition to the recovery of all monies and damages owed to City, shall be entitled to recover from Contractor the reasonable attorney's fees and court costs incurred by City as a result of such breach.

8.18 Miscellaneous

(a) No remedy of City shall be exclusive of any other remedy herein or provided by law as equity, but each shall be cumulative. (b) City's failure or forbearance to enforce any term hereof shall not be deemed to be a waiver of such right or claim, or any right of claim hereunder. Moreover, City's waiver of any term hereof shall not operate or be construed as a waiver of any subsequent breaches of the same or any other term. (c) If any of the terms hereof shall be determined to be invalid or unenforceable, the remaining terms shall remain in full force and effect. (d) The terms contained in this contract constitute the entire agreement between City and Contractor and supersedes all other oral or written Proposals, purchase orders, invoices, agreements and communications between City and Contractor relating to the subject matter hereof. (e) No term of this agreement may be modified or waived except by an instrument in writing signed by an authorized representative of the party against which enforcement of such modification or waiver is sought. (f) This agreement and all disputes arising hereunder shall be governed by and construed in accordance with the laws of the State of Georgia.

8.19 Special Stipulations

To the extent City attaches to this agreement any special terms which conflict with or are inconsistent with any of the foregoing terms, the attached special terms shall control.

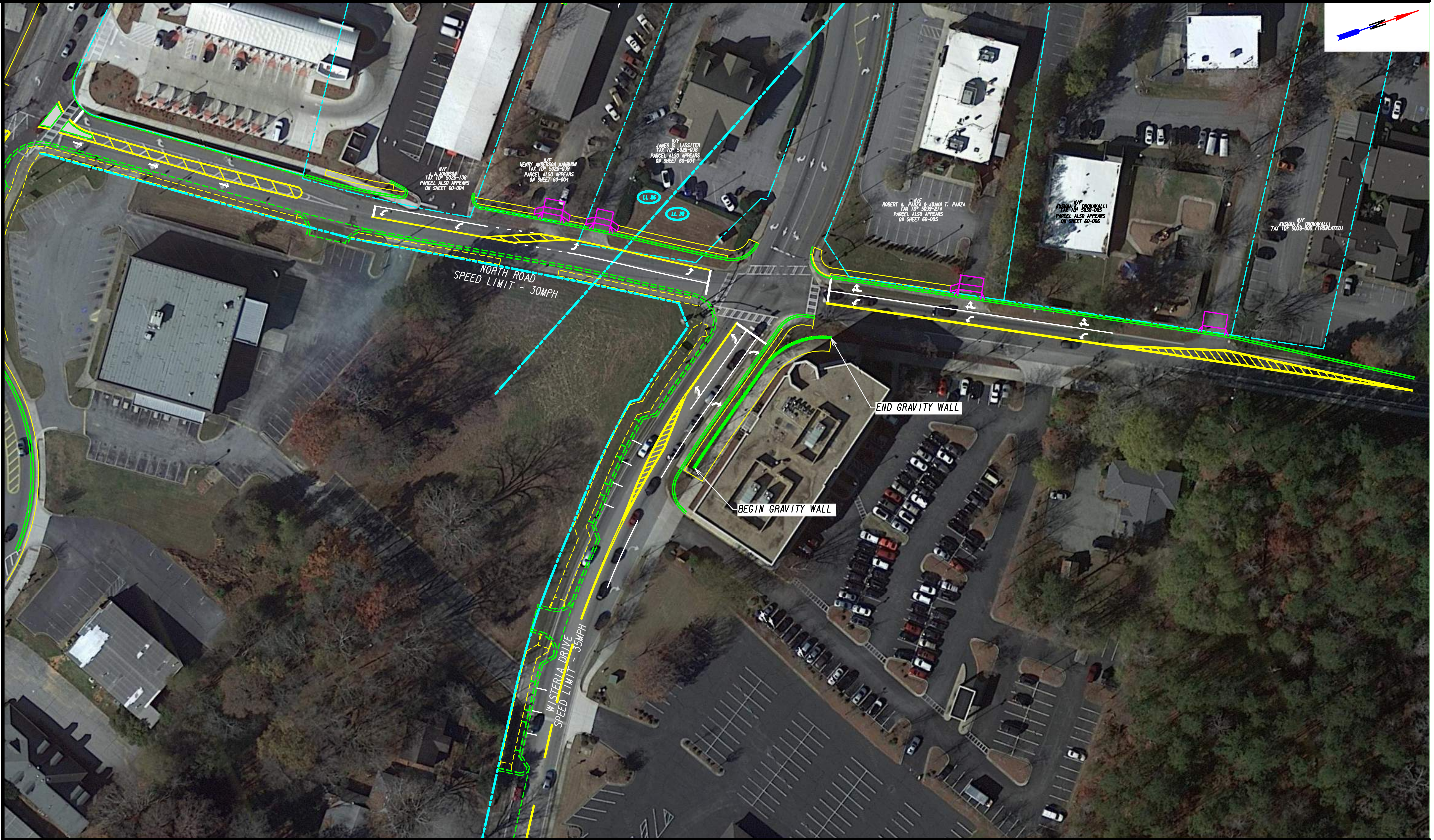
The Contract for design services will be with the City of Snellville.

9.0 EXHIBITS

Complete the following Exhibits E, F & G and return with the technical proposal.

EXHIBIT A

Project Schematic



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Atlanta, GA 30303-1283
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SCALE IN FEET
0 40 80 160

REVISION DATES

INSERSECTION MODIFICATIONS
NORTH ROAD AT WISTERIA DRIVE

CHECKED: DATE:
BACKCHECKED: DATE:
CORRECTED: DATE:
VERIFIED: DATE:
DRAWING No.

10/23/2015 GPLN

EXHIBIT B

Grove at Town Center DRI Study

The Grove at Towne Center:

Development of Regional Impact Traffic Study

Snellville, Georgia

PREPARED FOR: State Road & Tollway Authority
WOLVERTON PROJECT NO. 19-LD-006

DECEMBER 2019

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EXECUTIVE SUMMARY

The Grove at Towne Center is a proposed 18-acre mixed-use development in the City of Snellville, Georgia. Phase 1 of the development is planned for a ten (10)-acre site bounded by North Road on the west, Oak Road on the south, Clower Street on the east, and Wisteria Drive on the north. Phase 2 of the development is planned for an eight (8)-acre site across from (on the north side of) Wisteria Drive, and slightly east of, Phase 1.

This development will blend a variety of commercial and residential land uses into a Towne Center with amenity areas. The development will provide for residential uses in close proximity to employment, shopping, entertainment, and civic uses to create a walkable community. In conjunction with the development, new streetscape upgrades are proposed including additional hardscape with increased sidewalk widths and additional parallel parking along Wisteria Drive, North Street, and Oak Road. Phase 1 will also include three new streets with angled parking. The project will enhance the connectivity between uses and will allow for a more pedestrian friendly area with walkability between the land uses.

This Development of Regional Impact Traffic Study analyzes the anticipated traffic impacts associated with the proposed Grove at Towne Center. While the study assumes future traffic volumes will increase based on demand for the proposed development and overall growth, the overall tenor of the area will change and likely encourage drivers to avoid using these roadways as a cut-through to avoid the SR 124 and US 78 intersections, particularly on Wisteria Drive and Oak Road. Recent improvements to the US 78 at SR 124 intersection have significantly reduced the friction previously experienced by drivers.

As part of the traffic study, a trip generation analysis was performed to determine the volume of traffic that would be generated by the proposed development. The project is expected to generate a net of 8,162 new trips per day, with 203 new trips occurring during the morning peak hour, and 765 new trips occurring during the evening peak hour.

Capacity analysis was performed for the Future Background and Future With Project peak hour conditions. Level-of-service (LOS) D or better was considered adequate. Several intersections are projected to have inadequate LOS, including: SR 124 at Wisteria Drive, Wisteria Drive at North Road, Wisteria Drive at Clower Street, SR 124 at Oak Road, Oak Road at North Road, Oak Road at Street A, Oak Road at Clower Street, and US 78 at Wisteria Drive.

A Back of Queue analysis indicated that several intersections have existing or potential queuing problems: SR 124 at Wisteria Drive, Wisteria Drive at North Road, Wisteria Drive at Clower Street, SR 124 at Oak Road, Oak Road at North Road, Oak Road at Street A, US 78 at Oak Road, and US 78 at Wisteria Drive.

Recommendations for changes to the intersection control or geometry include: improvements to SR 124 at Wisteria Drive, addition of a westbound left turn lane at Wisteria Drive at North Road, intersection control change at Wisteria Drive at Clower Street from all-way stop-control (AWSC) to a mini roundabout, addition of a southbound left turn lane at Oak Road at North Road, and intersection control change at Oak Road at Clower Street from two-way stop-control (TWSC) to AWSC. While certain improvements proposed for the development show unacceptable LOS in some peak periods, the existing cut through traffic volumes are expected to be reduced by the development changing the nature of Wisteria Drive and Oak Road from cut through roads to more walkable, pedestrian friendly streets, where vehicles that do utilize the roadways are doing so at lower speeds.

1. INTRODUCTION

The Grove at Towne Center is a multi-use public/private partnership development to be located on the east side of SR 124 between Wisteria Drive and Oak Road in Snellville, Georgia. A traffic study tied to a Development of Regional Impact was performed to determine how much new traffic would be generated by the proposed development and how the new traffic would impact the existing roadway network.

1.1 STUDY AREA

The City of Snellville provided ten existing intersections and six proposed intersections they wanted analyzed as part of the report. In addition to these intersections, the GRTA DRI Technical Guidelines specify that the study area should include all segments that exceed 7% of the two-way, daily service volumes at the appropriate level of service standard. Additional segments that were analyzed for the 7% threshold include: Henry Clower Boulevard between SR 124 and US 78 (eastern intersection), Pinehurst Road between SR 124 and North Road, Dogwood Road between SR 124 and North Road, North Road between Dogwood Road and Pinehurst Road, and North Road between Dogwood Road and Wisteria Drive. As shown in Table 1.1, none of the segments meet the 7% threshold.

TABLE 1.1 – SUMMARY OF STUDY AREA ROADWAYS

Roadway Segment	Signals/ Mile	Facility Type	Facility LOS Standard	Facility Service Volume @ Standard	Adj. Facility Service Volume @ Standard	Project Traffic Distribution	Project Trips Assigned	% Service Volume Consumed	Presumptive Impact (>7%)
Henry Clower (SR 124 south to US 78 east)	5.1	4LD-3	D	27,800	27,800	3.2%	188	0.7%	No
Pinehurst Rd (SR 124 to North Rd)	9.2	2LU-3	D	12,100	12,100	1.6%	94	0.8%	No
Dogwood Rd (SR 124 to North Rd)	7.2	2LU-3	D	12,100	9,680	1.6%	94	1.0%	No
North Rd (Dogwood to Pinehurst)	2.7	2LU-3	D	12,100	9,680	1.6%	94	1.0%	No
North Rd (Wisteria to Dogwood)	2.7	2LU-3	D	12,100	9,680	3.2%	188	1.9%	No

Figure 1.1 presents the location of the project site and identifies the 16 study intersections, which include:

1. SR 124 at Wisteria Drive
2. Wisteria Drive at North Road
3. Wisteria Drive at Parking Deck (proposed intersection)
4. Wisteria Drive at Street B (proposed intersection)
5. Wisteria Drive at Clower Street
6. North Road at Parking Deck (proposed intersection)
7. Street B at Street C (proposed intersection)
8. Clower Street at City Hall Drive/Street C
9. SR 124 at Oak Road
10. North Road at Oak Road
11. Oak Road at Street A (proposed intersection)
12. Oak Road at Street B (proposed intersection)
13. Oak Road at Clower Street
14. Oak Road at City Hall Drive
15. US 78 at Oak Road
16. US 78 at Wisteria Drive

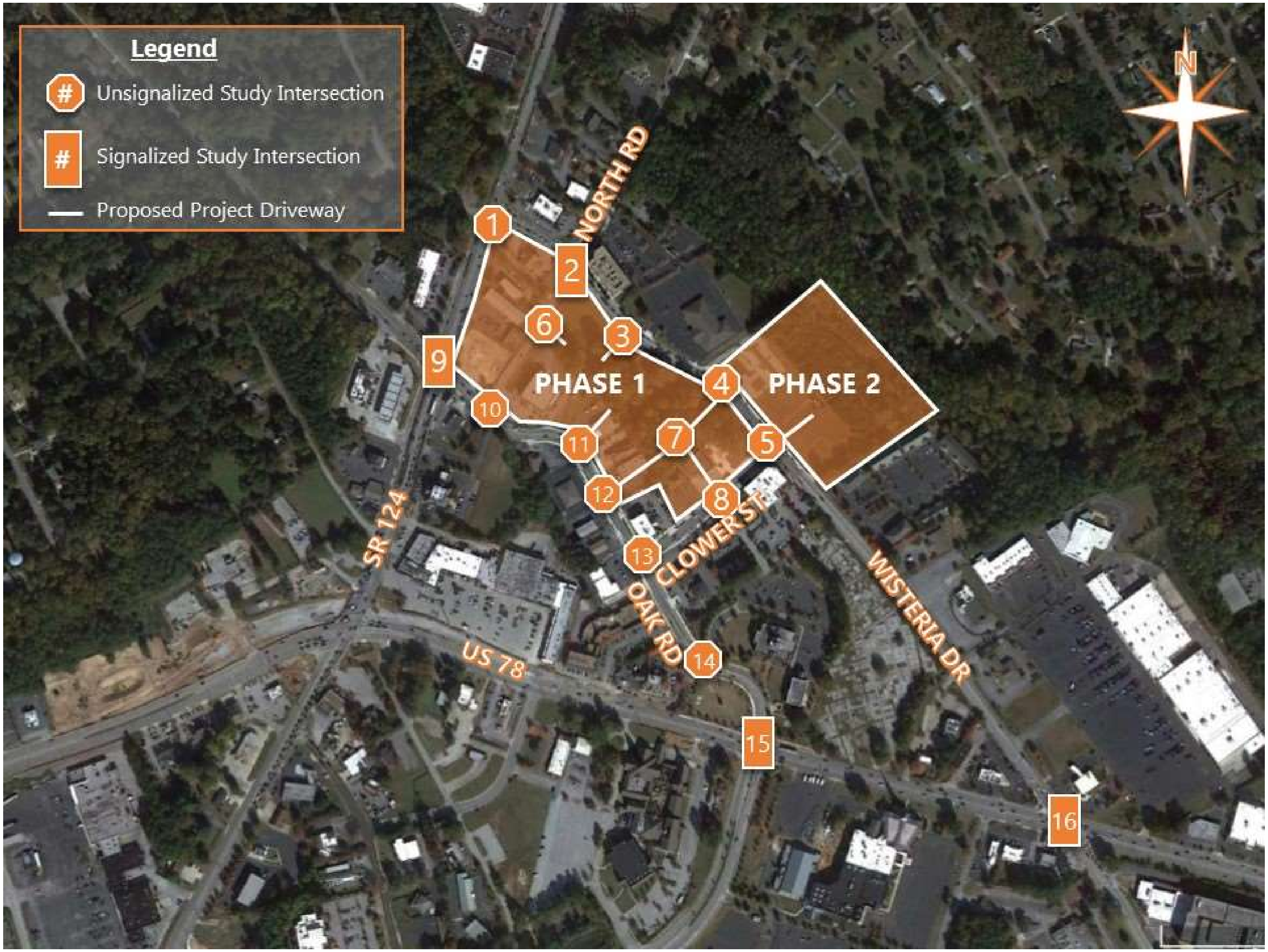


FIGURE 1.1 – AERIAL VIEW OF STUDY AREA

2. EXISTING CONDITIONS

2.1 ROADWAYS

SR 124 is a north-south route in the state highway system. SR 124 begins at an interchange with I-20 in DeKalb County and extends 51 miles north to its terminus at SR 11 in Jefferson County. Classified as a principal arterial according to GDOT's State Functional Classification Map, in the project area SR 124 has four travel lanes and a two-way left-turn (TWLT) lane.

US 78 is an east-west route in the national highway system. US 78 enters Georgia from Alabama in Haralson County and continues for 233 miles before exiting Georgia in Augusta and entering South Carolina. In the project area US 78 is classified as a principal arterial, has a 35-mph speed limit, and has four travel lanes and a TWLT lane.

The remaining roadways in the study area are local streets that serve traffic within the City of Snellville. Table 2.1 summarizes the existing conditions on each study area roadway.

TABLE 2.1 – SUMMARY OF STUDY AREA ROADWAYS

ROADWAY	FUNCTIONAL CLASSIFICATION	ORIENTATION (STUDY AREA)	NO. TRAVEL LANES	MEDIAN TYPE	SPEED LIMIT (MPH)	Non-Motorized Accommodations			ADJACENT LAND USES		
						Pedestrian	Bicycle	Transit	Residential	Commercial	Agricultural
US 78	Principal Arterial	East/West	4	TWLT Lane	35	●		●		●	
SR 124	Principal Arterial	North/South	2	TWLT Lane	45	●				●	
Wisteria Drive	Local Street	East/West*	2	TWLT Lane	35	●				●	
Oak Road	Local Street	East/West*	2	None	35	●				●	
North Road	Local Street	North/South	2	None	30	●				●	
Clower Street	Local Street	North/South	4	None	25	●				●	

**Wisteria Dr and Oak Rd are assumed to run north-south at SR 124*
Note - Functional Classifications were taken from GDOT Functional Classification Map Web Application

2.2 INTERSECTIONS

The existing lane geometries at each study intersection are shown in Figure 2.1. Pedestrian signals and marked crosswalks are provided at all signalized intersections and all streets have sidewalk. There are no bicycle facilities within the study area.

2.3 EXISTING TRAFFIC FLOW PATTERNS

Traffic counts were performed on Tuesday, October 1, 2019. The counts included 4-hour turning movement counts (TMCs) at the existing study intersections. 24-hour bi-directional tube counts were collected at the following locations:

1. Wisteria Drive west of Clower Street
2. Oak Road west of Clower Street
3. North Road between Wisteria Drive and Oak Road
4. Clower Street between Wisteria Drive and Oak Road

All traffic counts are included in **Appendix A**. Existing morning and evening peak hour traffic is shown in Figure 2.2.

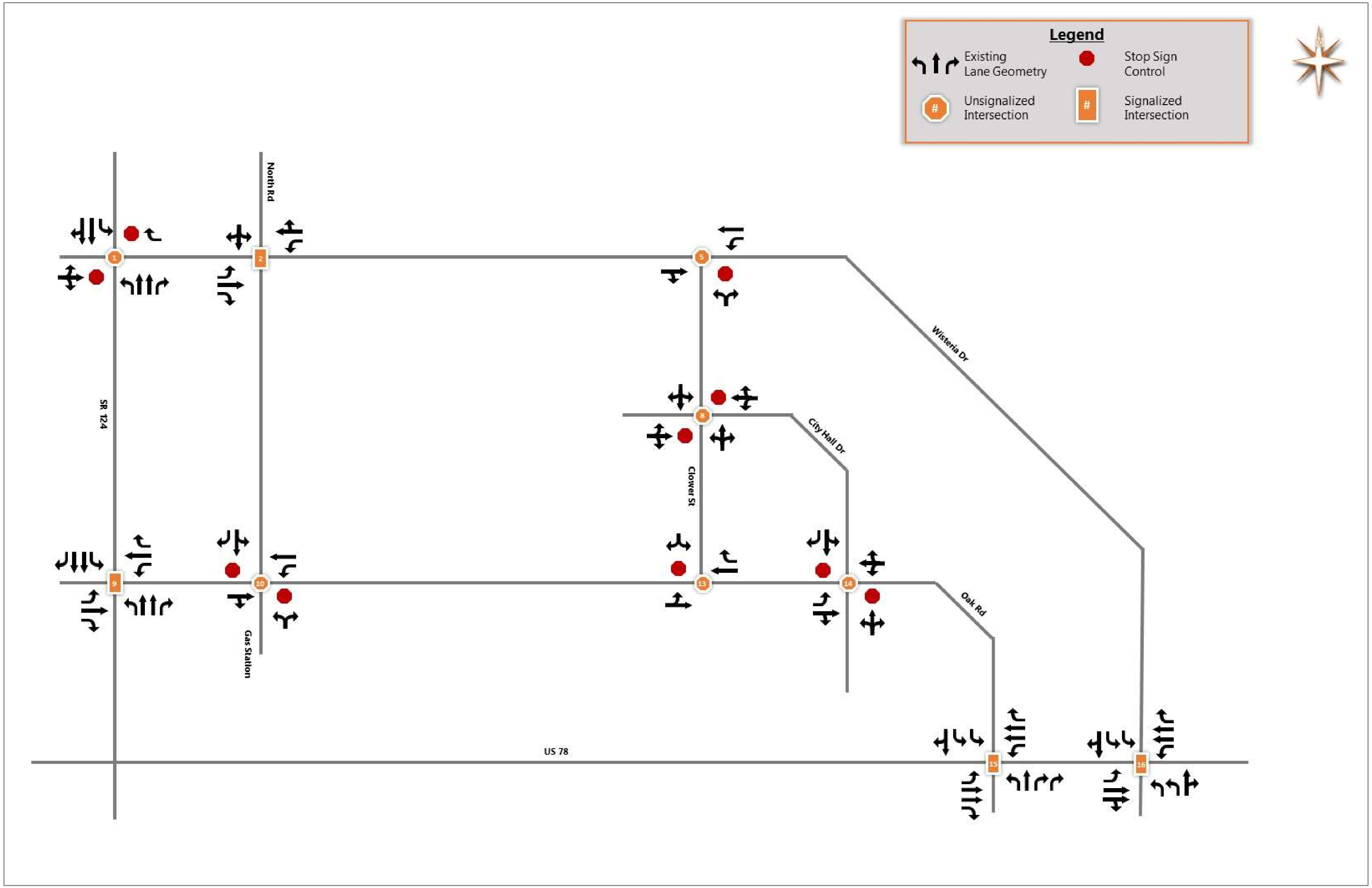


FIGURE 2.1 - EXISTING INTERSECTION GEOMETRIES

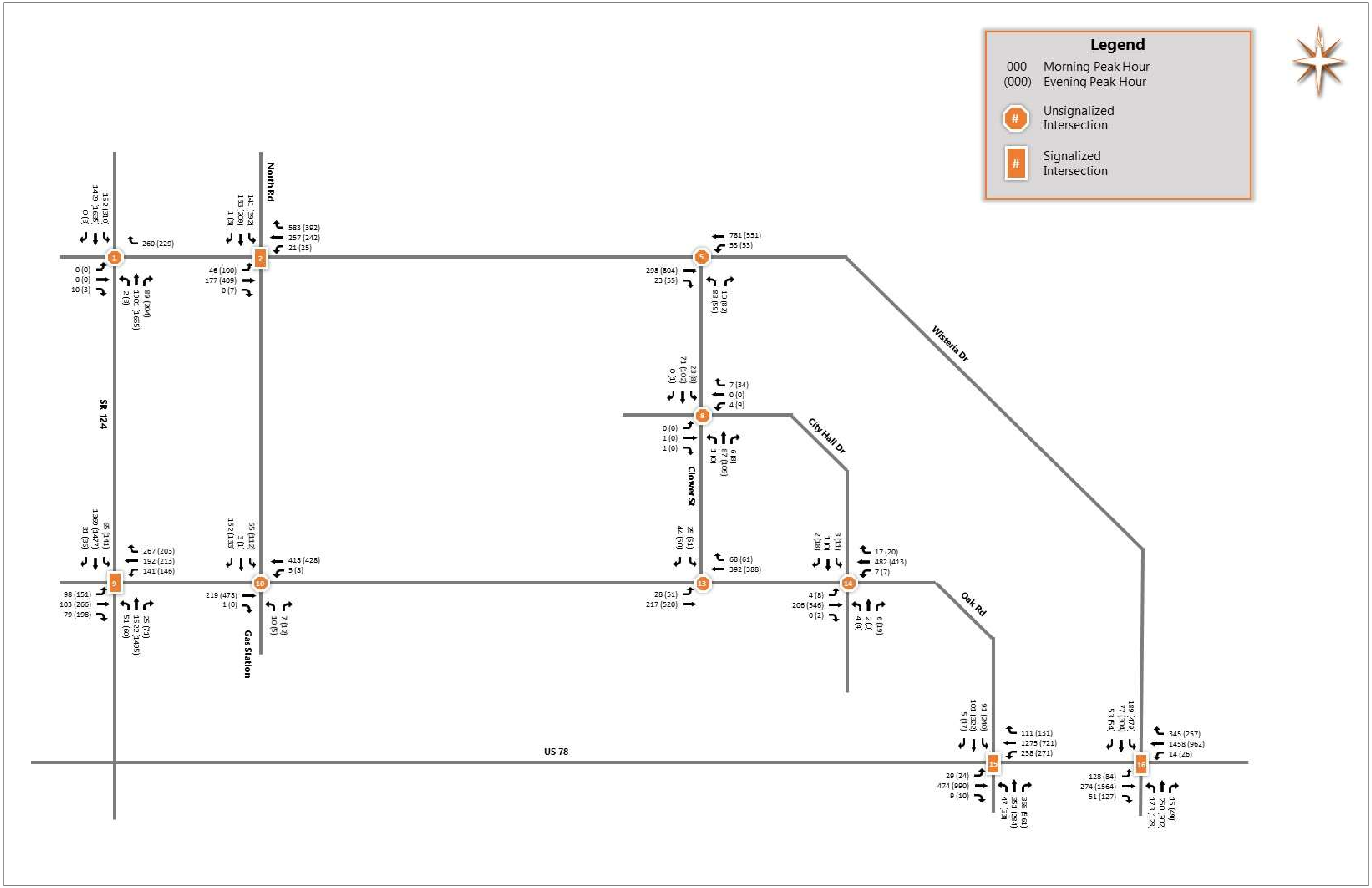


FIGURE 2.2 - EXISTING 2019 PEAK HOUR TRAFFIC

3. PROPOSED CONDITIONS

3.1 PROPOSED DEVELOPMENT

The proposed development is on approximately 18 total acres in the City of Snellville. Phase 1 of the project is planned for a site bounded by North Road on the west, Oak Road on the south, Clower Street on the east, and Wisteria Drive on the north. Phase 1 will also include three new streets with angled parking. Phase 2 is planned for a site across from (on the north side of) Wisteria Drive, and slightly east of, Phase 1. The overall project is proposed to consist of 429 multi-family residential units; 77,000 SF of commercial (a mix of retail and office) space; a 17,000 SF market with 17,000 SF of additional event space on the second floor, 8,200 SF of restaurant space; a 22,500 SF library with 22,500 SF of community space on the second floor; and a new town green. A site plan is shown in Figure 3.1, and the land uses by parcel are included in **Appendix B**.

As part of the project, several geometric changes are proposed in the study area. North Road is proposed to change from a one-way road to a two-way road between Wisteria Drive and Oak Road. North Road would have two lanes with no turn lanes. The existing TWLT lanes on Wisteria Drive and Oak Road are proposed to be eliminated and the right-of-way to be used for bulb-outs and street parking. Finally, there are two proposed all-way stop-controlled (AWSC) intersections in the study area. The existing Wisteria Drive at Clower Street intersection will be converted from two-way stop-control (TWSC) to AWSC, and the proposed Oak Road at Street A intersection will become an AWSC intersection.

3.2 PLANNED TRANSPORTATION IMPROVEMENTS

The US 78 at SR 124 Improvement Project, GDOT PI 0006439, is currently rebuilding the US 78 at SR 124 intersection into a Displaced Left Turn (DLT). In addition, GDOT PI 006921 is proposed to widen SR 124 from US 78 to SR 864/Ronald Reagan Parkway. For the purposes of this study, the US at SR 124 Improvement Project is assumed to be complete, while the widening of SR 124 is not assumed to be complete but may impact the recommendations.

Proposed study intersection geometries, which reflect both the project-related improvements and the planned GDOT intersection improvements, are shown in Figure 3.2.

FIGURE 3.1 - PROPOSED SITE PLAN

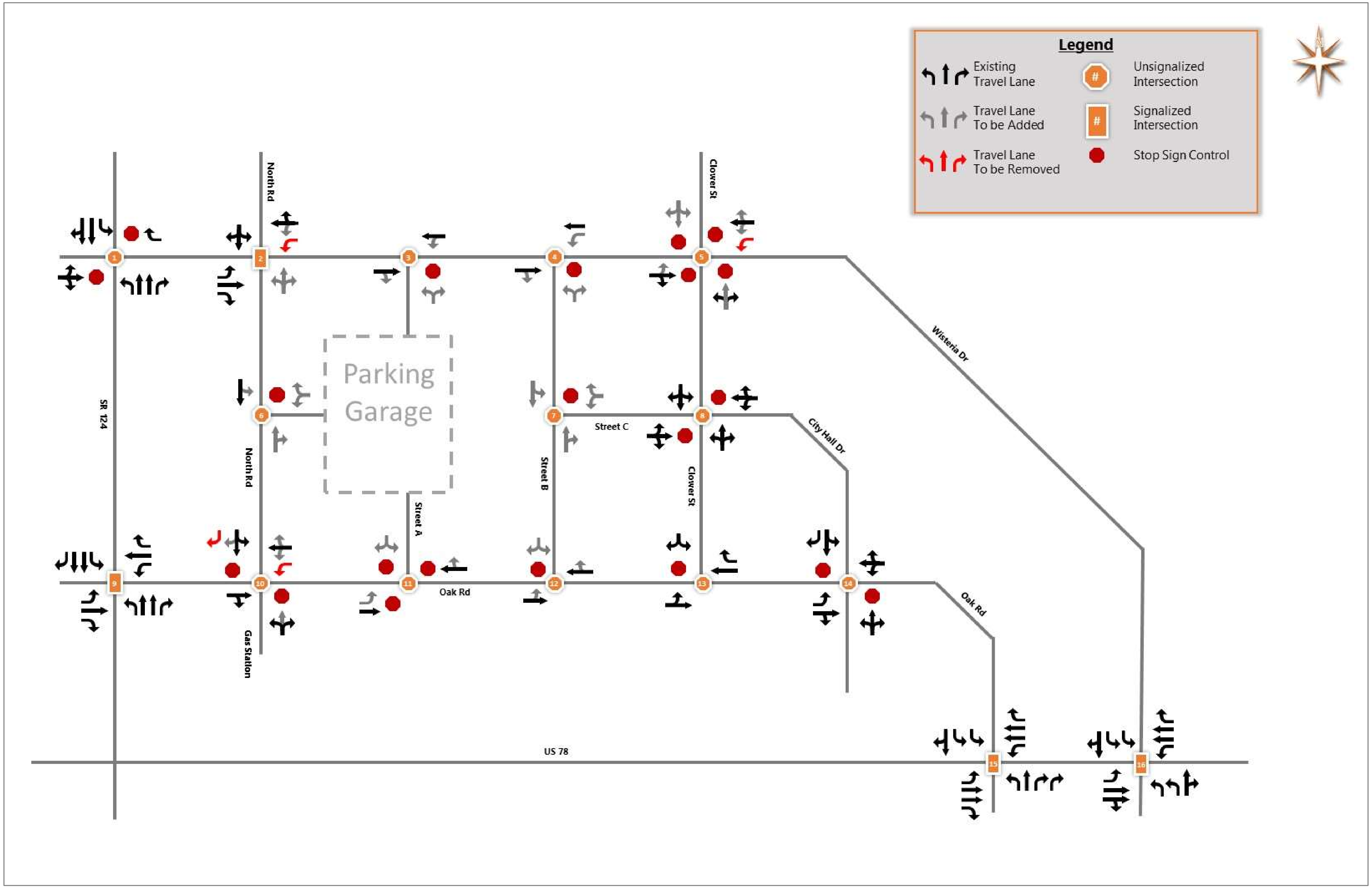


FIGURE 3.2 - PROPOSED STUDY INTERSECTION GEOMETRIES

4. TRAFFIC PROJECTIONS

4.1 FUTURE BACKGROUND TRAFFIC

A build-out year of 2023 was established for the project. An average annual growth rate was determined based on historic Average Annual Daily Traffic (AADT) counts recorded for nearby GDOT Count Stations. AADTs for Stations 135-0054 and 135-0187 were obtained from the Traffic Analysis and Data Application (TADA) website (gdottrafficdata.drakewell.com). An average annual growth rate of 2.0 percent per year was established for the study area.

The 2.0 percent average annual growth rate was applied to the 2019 traffic in the study area for a period of four years to establish the 2023 Background Traffic.

It is worth noting that future traffic volumes on Wisteria Drive and Oak Road may flatten or reduce due to the geometric changes on these streets and divert to US 78 or SR 124, and overall shift from cut through roads to development focused streets. Traffic counts from 2017 on SR 124 and US 78 showed volumes on US 78 near Oak Road and Wisteria Drive have decreased over time, possibly because recent construction at US 78 at SR 124 caused traffic to divert and use Oak Road and Wisteria Drive. For the purposes of this traffic study and to ensure a conservative estimate, it is assumed that traffic volumes in the study area will continue to increase at a 2% background growth rate in addition to the trips generated by the proposed development.

The Future 2023 Background peak hour traffic is shown in Figure 4.1.

4.2 TRIP GENERATION

The amount of traffic to be generated by the proposed development was estimated using trip rates observed at other similar developments. The Institute of Transportation Engineers' (ITE) *Trip Generation, 10th Edition (TGM)*, contains trip rates summarized by type of development. The ITE data provides trip rates which can be applied to the size of a development to derive trip generation projections.

Several existing businesses in the study are proposed to be removed due to the site development. These include a post office, a karate studio, and several stores. ITE Land Use Code 732 – Post Office was used for the post office and ITE Land Use Code 820 – Shopping Center was used for the remaining stores. The karate studio was not included with the existing trips because the participants typically arrive and depart by bus from the studio. These trips from the existing businesses will be subtracted from the proposed trips to estimate the final trips into and out of the proposed development.

A portion of the project-generated trips would be attracted to other land uses while on site. These trips are classified as internal trips. The Post Office does not fit the ITE Trip Generation categories for internal trip generation, so no internal trips are assumed for the existing condition. A portion of the project-generated trips would also be attracted into the site from traffic streams that are already passing by on an adjacent street. A pass-by rate of 34% applies to the shopping center in the PM peak hour.

The trips to be subtracted from the site are shown in Table 4.1.

TABLE 4.1 – EXISTING TRIPS (TO BE REMOVED)

Land Use/Size	Code	Size/ Unit	Trip Type	Weekday			AM Peak Hour			PM Peak Hour		
				Total	Entry	Exit	Total	Entry	Exit	Total	Entry	Exit
Post Office	732	11.4 KSF	Internal	0	0	0	0	0	0	0	0	0
			Pass-By	0	0	0	0	0	0	0	0	0
			Primary	1,182	591	591	168	87	81	127	65	62
			Total	1,182	591	591	168	87	81	127	65	62
Shopping Center	820	16.8 KSF	Internal	0	0	0	0	0	0	0	0	0
			Pass-By	304	152	152	0	0	0	49	23	26
			Primary	1,484	742	742	160	99	61	96	46	50
			Total	1,788	894	894	160	99	61	145	69	76
Total			Internal	0	0	0	0	0	0	0	0	0
			Pass-By	304	152	152	0	0	0	49	23	26
			Primary	2,666	1,333	1,333	328	186	142	223	111	112
			Total	2,970	1,485	1,485	328	186	142	272	134	138

The proposed development that will generate trips include two multi-family residential spaces over retail areas, a library, community space above the library, a market, event space above the market, a restaurant, and commercial space. ITE Land Use Code 221 – Multifamily Housing (Mid-Rise) will be used for all residential development on the site. This land use includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three (3) and ten (10) floors. ITE Land Use Code 495 – Recreational Community Center will be used for the community space above the library and the event space above the market. This land use is for stand-alone recreational community centers. ITE Land Use Code 590 – Library will be used for the library. ITE Land Use Code 820 will be used for the market and all commercial space, including commercial space underneath the residential areas. This land use includes an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. ITE Land Use Code 932 – High-Turnover (Sit-Down) Restaurant will be used for the proposed restaurant. This land use consists of sit-down, full service eating establishments with typical duration of stay of approximately one hour.

For the proposed development, the following assumptions were made:

- There are no vehicular trips between parcels. Any trips between parcels will involve pedestrians.
- The total area/dwelling units for each land was calculated as one larger area instead of calculated separately. For example, there are three parcels with ITE Land Use Code 221 – Multifamily Housing (Mid-Rise). Instead of calculating the number of trips generated by each parcel separately, the number of trips generated by the entire development for residential use was calculated. Once internal, pass-by, primary, and total trips had been calculated for the entire development, the number of trips for each parcel was calculated by dividing the total trips by the proportion of square footage. For example, the total number of weekday trips for residential land use is 2,219 trips. Parcel 1 has 64% of all residential square footage, so the number of weekday trips for residential use to/from Parcel 1 is 2,336 trips x 0.64 = 1,420 trips.

- The pass-by rates for each land use will only apply to external trips. For example, if the internal trip rate for a land use is 50% and the pass-by rate is also 50%, then the adjusted pass-by rate will be 25%.

- Pass-by rates have been checked to ensure the pass-by trips do not exceed 15% of the adjacent street volume. For this project, the 15% applies to US 78 and SR 124 rather than the local roads as these trips are assumed to be diverted off of these two roadways.

- The number of trips to/from the site was reduced by 5% to account for alternative methods of transportation such as walking, biking, or future transit options including proposed microbus facilities.

- Although future traffic volumes on Wisteria Drive and Oak Road may flatten or reduce due to the geometric changes on these streets and divert to US 78 or SR 124, it is assumed that volumes on these streets will continue to increase at a 2% background growth rate in addition to the trips generated by the proposed development.

Table 4.2 shows the trips to be generated by the proposed development. The total number of trips for each land use has been reduced by 5% to account for alternative methods of transportation.

TABLE 4.2 – TRIP GENERATION TABLE (TRIPS TO BE ADDED)

Land Use/Size	Code	Size/ Unit	Trip Type	Weekday			AM Peak Hour			PM Peak Hour		
				Total	Entry	Exit	Total	Entry	Exit	Total	Entry	Exit
Multifamily Housing (Mid-Rise)	221	429 Dwelling Units	Internal	626	313	313	11	2	9	82	52	31
			Pass-By	0	0	0	0	0	0	0	0	0
			Primary	1,593	797	797	125	33	92	88	52	36
			Total	2,219	1,110	1,110	136	35	101	170	104	67
Community Space/ Event Space	495	39.5 KSF	Internal	0	0	0	0	0	0	0	0	0
			Pass-By	0	0	0	0	0	0	0	0	0
			Primary	1,066	533	533	106	70	36	115	54	61
			Total	1,066	533	533	106	70	36	115	54	61
Library	590	22.5 KSF	Internal	0	0	0	0	0	0	0	0	0
			Pass-By	0	0	0	0	0	0	0	0	0
			Primary	1,497	749	749	22	17	7	183	88	95
			Total	1,497	749	749	22	17	7	183	88	95
Shopping Center	820	94 KSF	Internal	770	385	385	16	6	10	97	35	62
			Pass-By	748	374	374	0	0	0	135	68	66
			Primary	3,958	1,979	1,979	173	111	62	261	133	129
			Total	5,476	2,738	2,738	189	117	72	493	237	257
High-Turnover (Sit-Down) Restaurant	932	8.2 KSF	Internal	346	173	173	24	18	6	37	21	16
			Pass-By	96	48	48	0	0	0	17	11	5
			Primary	432	216	216	54	25	30	22	15	7
			Total	874	437	437	78	43	35	76	48	29
Total			Internal	1,742	871	871	50	26	25	217	108	108
			Pass-By	844	422	422	0	0	0	151	80	72
			Primary	8,547	4,273	4,273	481	257	226	669	342	327
			Total	11,132	5,566	5,566	531	282	251	1,037	530	507

The existing site trips were subtracted from the proposed development trips to obtain the net trips. Table 4.3 shows the net trips generated by the site.

TABLE 4.3 – TRIP GENERATION RESULTS

Existing or Proposed	Trip Type	Weekday			AM Peak Hour			PM Peak Hour		
		Total	Entry	Exit	Total	Entry	Exit	Total	Entry	Exit
Existing	Internal	0	0	0	0	0	0	0	0	0
	Pass-By	304	152	152	0	0	0	49	23	26
	Primary	2,666	1,333	1,333	328	186	142	223	111	112
	Total	2,970	1,485	1,485	328	186	142	272	134	138
Proposed	Internal	1,742	871	871	50	26	25	217	108	108
	Pass-By	844	422	422	0	0	0	151	80	72
	Primary	8,547	4,273	4,273	481	257	226	669	342	327
	Total	11,132	5,566	5,566	531	282	251	1,037	530	507
Net	Internal	1,742	871	871	50	26	25	217	108	108
	Pass-By	540	270	270	0	0	0	102	56	46
	Primary	5,881	2,940	2,940	153	71	84	447	232	215
	Total	8,162	4,081	4,081	203	96	109	765	396	369

The proposed site will generate a net of 8,162 weekday trips, 203 AM peak hour trips, and 765 PM peak hour trips.

4.3 DISTRIBUTION OF PROJECT-GENERATED TRIPS

The trips generated by the proposed Snellville Town Center were distributed to the surrounding roadway network based on volumes from nearby GDOT traffic count stations. 32% of the proposed development's trips are expected to be to/from the north on SR 124, 27% to/from the west on US 78, 16% to/from the south on SR 124, and 25% to/from the east on US 78. This distribution was used for the assignment of new trips for the proposed development.

One the trip distribution to the overall site was determined, micro distribution was used to determine trips to each of the parcels. It was assumed that vehicles would attempt to park close to their destination. Figure 4.2 presents the peak hour trip distribution for both new trips and pass-by trips.

4.4 ASSIGNMENT OF PROJECT-GENERATED TRIPS

The number of new and pass-by trips were distributed to the roadway network based on the trip distribution determined for the study area. The project-generated traffic was superimposed with the Future Background traffic to provide an estimate of traffic that would be present when the proposed development opens. Future With Project peak hour traffic is shown in Figure 4.3.

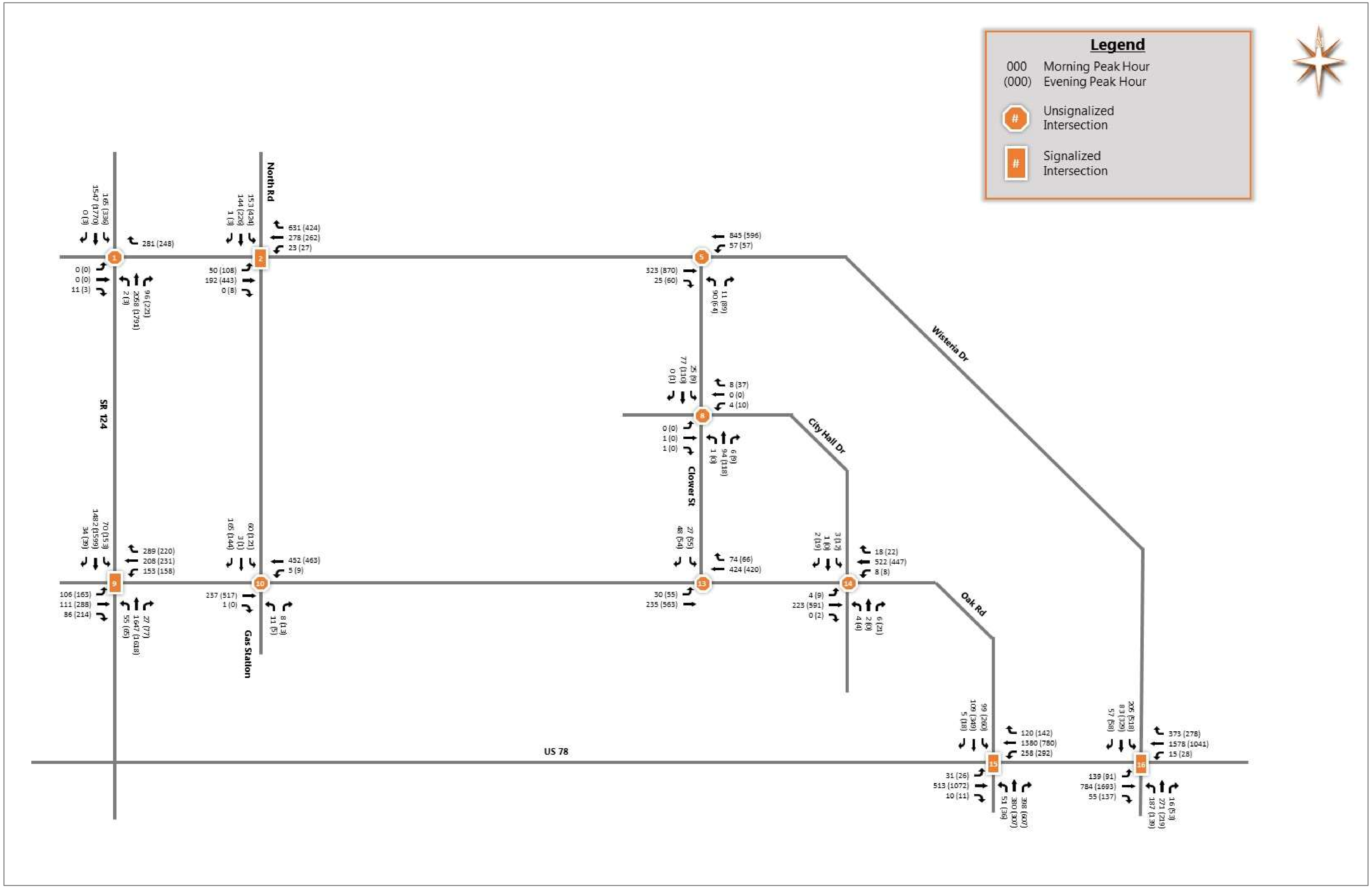


FIGURE 4.1 - FUTURE 2023 BACKGROUND PEAK HOUR TRAFFIC

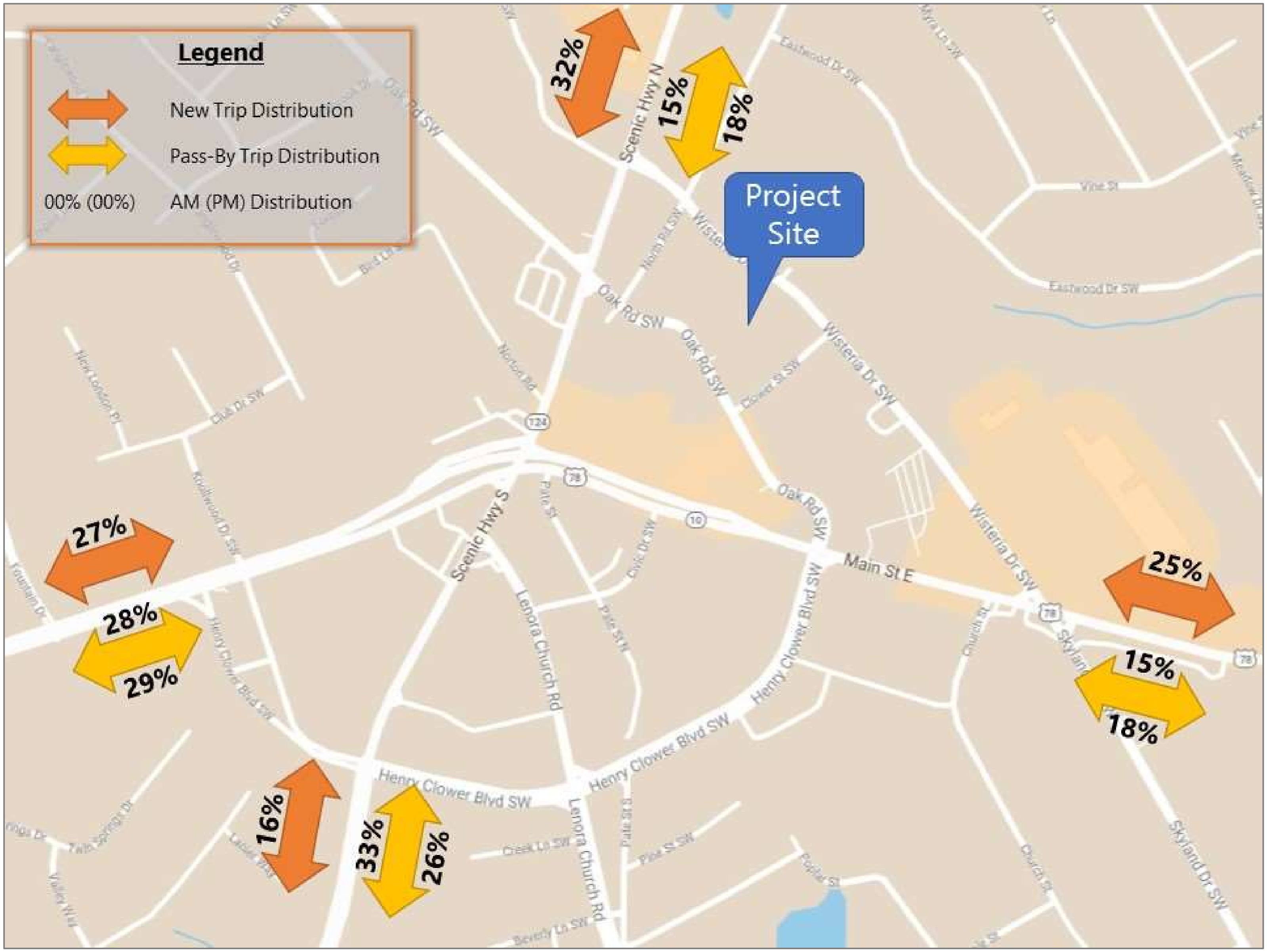


FIGURE 4.2 – PROJECT PEAK HOUR TRIP DISTRIBUTION OF TRIPS

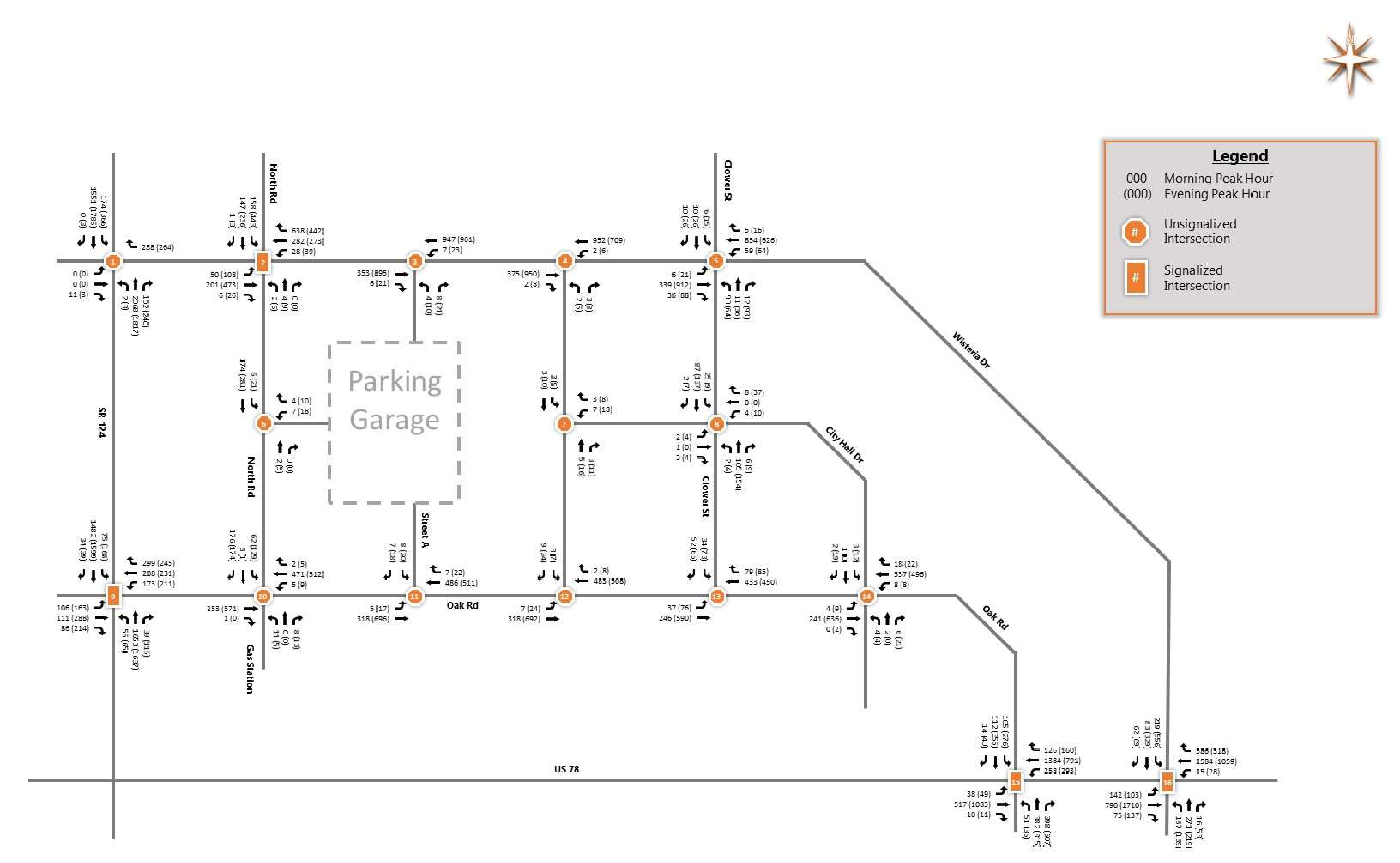


FIGURE 4.3 – FUTURE 2023 WITH PROJECT PEAK HOUR TRAFFIC

5. CAPACITY ANALYSIS

In order to quantify the impacts of additional traffic and to determine any needed roadway and/or operational improvements, a capacity analysis was performed for the Future Background and the Future With Project peak hour conditions based on the methodology outlined in the *Highway Capacity Manual* (*HCM*). Various computer programs are available which implement the *HCM* methodology. HCS7 software was used to analyze the unsignalized intersections and *Synchro 9* was used to analyze the signalized intersections.

HCM defines level of service (LOS) in terms of the amount of control delay, including initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The LOS categories range from A to F, with different thresholds specified according to the type of stop control at the intersection. The LOS criteria for both unsignalized and signalized intersections are listed in Table 5.1.

TABLE 5.1 – LEVEL OF SERVICE CRITERIA

Level of Service (LOS)	Unsignalized Control Delay per Vehicle (sec)	Signalized Control Delay per Vehicle (sec)
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

Rural, sparsely developed areas have a minimum LOS requirement of C based on rural residents' expectation for relatively uncongested conditions in combination with design flexibility associated with lower right of way costs. The minimum LOS for urban areas is D, reflecting the greater acceptance of delay and congestion by urban residents. Additionally, the increased density of developments makes right of way costs much higher in urban areas. The study area is in an urban location. A minimum LOS D is assumed for the study intersections.

5.1 EXISTING INTERSECTION CAPACITY ANALYSIS

Capacity analysis was performed for the Existing conditions in both the morning (AM) and evening (PM) peak hour conditions. The existing geometry was used for the existing analysis. Capacity analysis reports are included in **Appendix C**. The results of the analysis are listed in Table 5.2.

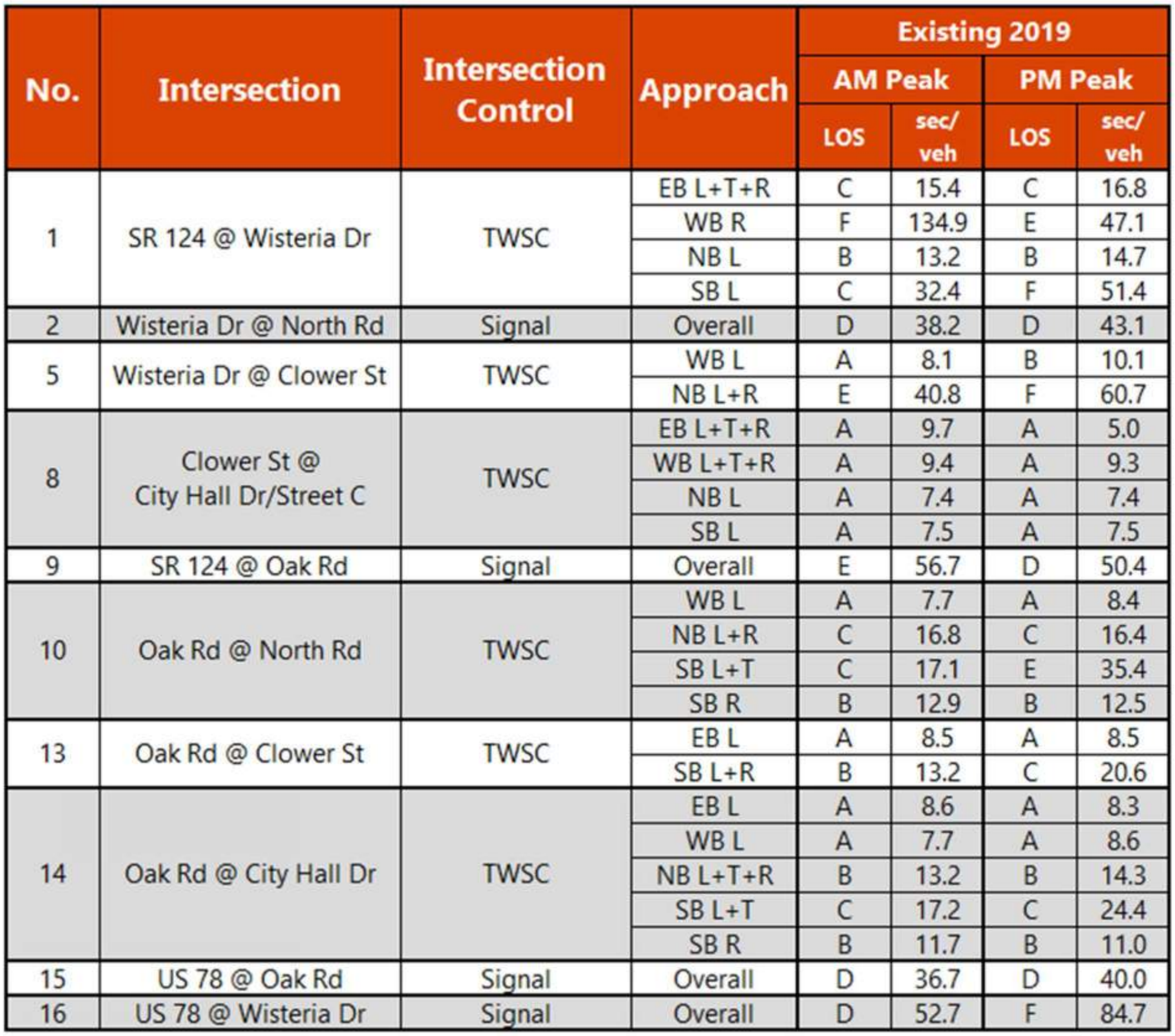
The results indicate that two signalized intersections currently have inadequate LOS: SR 124 at Oak Rd currently operates at LOS E in the AM peak hour and US 78 at Wisteria Drive currently operates at LOS F in the PM peak hour. Movements at unsignalized intersections with inadequate LOS include: the westbound right turn at SR 124 at Wisteria Drive in the AM and PM, the southbound left-turn at SR 124 at Wisteria Drive in the PM, the northbound left turn/right turn at Wisteria Drive at Clower Street in both peak hours, and the southbound left/through at Oak Road at North Road in the PM.

on

northbound

on

TABLE 5.2 – EXISTING LOS AND DELAY AT STUDY INTERSECTIONS

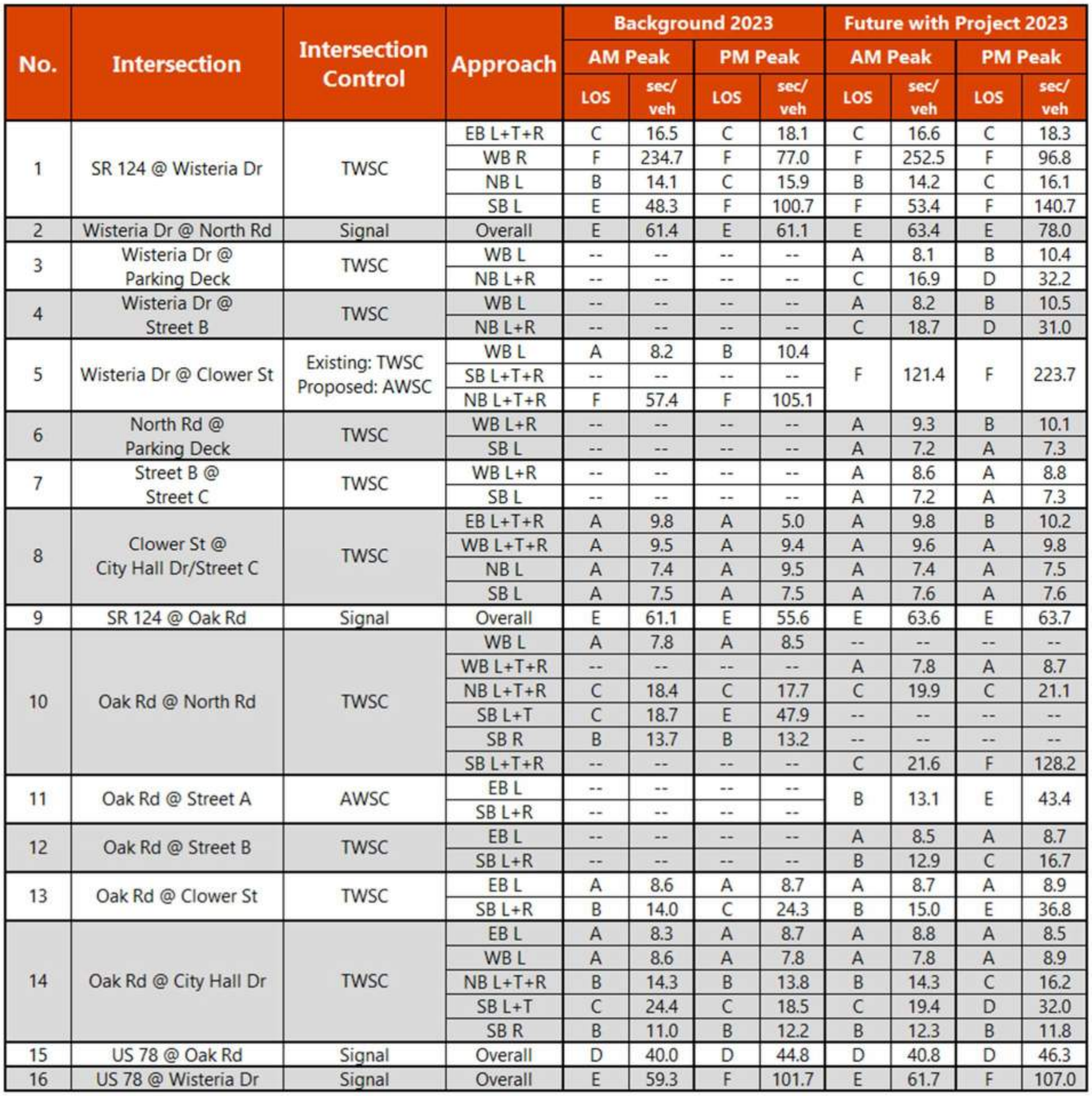


No.	Intersection	Intersection Control	Approach	Existing 2019			
				AM Peak		PM Peak	
				LOS	sec/ veh	LOS	sec/ veh
1	SR 124 @ Wisteria Dr	TWSC	EB L+T+R	C	15.4	C	16.8
			WB R	F	134.9	E	47.1
			NB L	B	13.2	B	14.7
			SB L	C	32.4	F	51.4
2	Wisteria Dr @ North Rd	Signal	Overall	D	38.2	D	43.1
5	Wisteria Dr @ Clower St	TWSC	WB L	A	8.1	B	10.1
			NB L+R	E	40.8	F	60.7
8	Clower St @ City Hall Dr/Street C	TWSC	EB L+T+R	A	9.7	A	5.0
			WB L+T+R	A	9.4	A	9.3
			NB L	A	7.4	A	7.4
			SB L	A	7.5	A	7.5
9	SR 124 @ Oak Rd	Signal	Overall	E	56.7	D	50.4
10	Oak Rd @ North Rd	TWSC	WB L	A	7.7	A	8.4
			NB L+R	C	16.8	C	16.4
			SB L+T	C	17.1	E	35.4
			SB R	B	12.9	B	12.5
13	Oak Rd @ Clower St	TWSC	EB L	A	8.5	A	8.5
			SB L+R	B	13.2	C	20.6
14	Oak Rd @ City Hall Dr	TWSC	EB L	A	8.6	A	8.3
			WB L	A	7.7	A	8.6
			NB L+T+R	B	13.2	B	14.3
			SB L+T	C	17.2	C	24.4
			SB R	B	11.7	B	11.0
15	US 78 @ Oak Rd	Signal	Overall	D	36.7	D	40.0
16	US 78 @ Wisteria Dr	Signal	Overall	D	52.7	F	84.7

5.2 FUTURE INTERSECTION CAPACITY ANALYSIS

Intersection capacity analysis was performed for the AM and PM peak hours in both the Future Background and the Future With Project conditions. The LOS and delay results are listed in Table 5.3. Capacity analysis reports for the analysis are included in **Appendix C**.

TABLE 5.3 – FUTURE YEAR 2023 DELAY AND LOS RESULTS



No.	Intersection	Intersection Control	Approach	Background 2023				Future with Project 2023			
				AM Peak		PM Peak		AM Peak		PM Peak	
				LOS	sec/veh	LOS	sec/veh	LOS	sec/veh	LOS	sec/veh
1	SR 124 @ Wisteria Dr	TWSC	EB L+T+R	C	16.5	C	18.1	C	16.6	C	18.3
			WB R	F	234.7	F	77.0	F	252.5	F	96.8
			NB L	B	14.1	C	15.9	B	14.2	C	16.1
			SB L	E	48.3	F	100.7	F	53.4	F	140.7
2	Wisteria Dr @ North Rd	Signal	Overall	E	61.4	E	61.1	E	63.4	E	78.0
3	Wisteria Dr @ Parking Deck	TWSC	WB L	--	--	--	--	A	8.1	B	10.4
			NB L+R	--	--	--	--	C	16.9	D	32.2
4	Wisteria Dr @ Street B	TWSC	WB L	--	--	--	--	A	8.2	B	10.5
			NB L+R	--	--	--	--	C	18.7	D	31.0
5	Wisteria Dr @ Clower St	Existing: TWSC Proposed: AWSC	WB L	A	8.2	B	10.4	F	121.4	F	223.7
			SB L+T+R	--	--	--	--				
			NB L+T+R	F	57.4	F	105.1				
6	North Rd @ Parking Deck	TWSC	WB L+R	--	--	--	--	A	9.3	B	10.1
			SB L	--	--	--	--	A	7.2	A	7.3
7	Street B @ Street C	TWSC	WB L+R	--	--	--	--	A	8.6	A	8.8
			SB L	--	--	--	--	A	7.2	A	7.3
8	Clower St @ City Hall Dr/Street C	TWSC	EB L+T+R	A	9.8	A	5.0	A	9.8	B	10.2
			WB L+T+R	A	9.5	A	9.4	A	9.6	A	9.8
			NB L	A	7.4	A	9.5	A	7.4	A	7.5
			SB L	A	7.5	A	7.5	A	7.6	A	7.6
9	SR 124 @ Oak Rd	Signal	Overall	E	61.1	E	55.6	E	63.6	E	63.7
10	Oak Rd @ North Rd	TWSC	WB L	A	7.8	A	8.5	--	--	--	--
			WB L+T+R	--	--	--	--	A	7.8	A	8.7
			NB L+T+R	C	18.4	C	17.7	C	19.9	C	21.1
			SB L+T	C	18.7	E	47.9	--	--	--	--
			SB R	B	13.7	B	13.2	--	--	--	--
			SB L+T+R	--	--	--	--	C	21.6	F	128.2
11	Oak Rd @ Street A	AWSC	EB L	--	--	--	--	B	13.1	E	43.4
			SB L+R	--	--	--	--				
12	Oak Rd @ Street B	TWSC	EB L	--	--	--	--	A	8.5	A	8.7
			SB L+R	--	--	--	--	B	12.9	C	16.7
13	Oak Rd @ Clower St	TWSC	EB L	A	8.6	A	8.7	A	8.7	A	8.9
			SB L+R	B	14.0	C	24.3	B	15.0	E	36.8
14	Oak Rd @ City Hall Dr	TWSC	EB L	A	8.3	A	8.7	A	8.8	A	8.5
			WB L	A	8.6	A	7.8	A	7.8	A	8.9
			NB L+T+R	B	14.3	B	13.8	B	14.3	C	16.2
			SB L+T	C	24.4	C	18.5	C	19.4	D	32.0
			SB R	B	11.0	B	12.2	B	12.3	B	11.8
15	US 78 @ Oak Rd	Signal	Overall	D	40.0	D	44.8	D	40.8	D	46.3
16	US 78 @ Wisteria Dr	Signal	Overall	E	59.3	F	101.7	E	61.7	F	107.0

The future delay and LOS results indicate that several intersections are expected to operate unacceptably during the year 2023:

1. SR 124 at Wisteria Drive: Two movements that currently operate with inadequate LOS in the Existing conditions are expected to further worsen by 2023. In both the Future Background and Future With Project conditions, the Wisteria Drive westbound right turn and the SR 124 southbound left turn are expected to operate at a LOS F.
2. Wisteria Drive at North Road: By the year 2023 this intersection is expected to operate at a LOS E. The Wisteria Drive westbound left turn lane is proposed to be removed as part of the development which will further worsen operations at this intersection.
5. Wisteria Drive at Clower Street: The Clower Street northbound approach currently operates with unacceptable LOS in the Existing conditions. While the conversion of this intersection from TWSC to AWSC is expected to reduce northbound delay, the overall

intersection delay is expected to significantly increase. In the 2023 Future With Project conditions, the AM peak is expected to have a LOS F with 121s of delay, while the PM peak is expected to have a LOS F with 224s of delay.

9. SR 124 at Oak Road: This intersection currently operates at a LOS E in the Existing conditions. In the Future Background conditions this intersection is expected to operate at a LOS E in both peak hours. In the Future With Project conditions, delay is expected to increase, although LOS is projected to remain at a LOS E.
10. Oak Road at North Road: The Oak Road southbound left turn movement currently operates at a LOS E in the Existing conditions. The southbound approach is proposed to be changed from two turn lanes (one left turn, one right turn) to one lane (one left/through lane). In the Future With Project conditions, the southbound approach is expected to operate at a LOS F with 128s of delay.
11. Oak Road at Street A: This proposed AWSC intersection is expected to operate at a LOS E in the 2023 Future With Project conditions in the PM peak hour. In the PM peak hour the Oak Road westbound and Street A southbound approaches are projected to operate acceptably; the Oak Road eastbound approach is projected to operate at a LOS F.
13. Oak Road at Clower Street: This intersection currently operates at an acceptable LOS and is projected to continue to operate at an acceptable LOS in the Future Background conditions. The additional traffic generated by the development is expected to worsen the Clower Street southbound approach LOS in the PM from a LOS C in the Future Background Conditions to a LOS E in the Future With Project Conditions.
15. US 78 at Wisteria Drive: This intersection currently operates at LOS F in the PM peak hour. By the year 2023 this intersection is expected to operate at a LOS E in the AM peak hour and a LOS F in the PM peak hour. The proposed development is expected to increase delay during both peak hours, although the LOS score will remain a LOS E in the AM peak hour and a LOS F in the PM peak hour.

5.3 BACK OF QUEUE ANALYSIS

Back of Queue (BOQ) analysis was used to analyze the storage needs for the existing and proposed turn lanes in the Future With Project conditions. The 95th percentile BOQ length was calculated for the turn lanes at each intersection. The queue is expected to be the reported length or shorter 95 percent of the time. The BOQ results were taken from the capacity analysis reports for each study intersection. Table 5.4 lists the BOQ lengths for each peak hour for the Existing, Future Background, and Future With Project conditions.

TABLE 5.4 – BACK OF QUEUE RESULTS

No.	Intersection	Intersection Control	Movement	Existing Storage (feet)	95th Percentile Back of Queue (feet)					
					Existing 2019		Background 2020		With Project 2020	
1	SR 124 @ Wisteria Dr	TWSC	EB L+T+R	--	25	0	25	0	25	0
			WB R	--	300	150	425	225	450	275
			NB L	--	0	0	0	0	0	0
			SB L	--	100	200	125	325	150	400
2	Wisteria Dr @ North Rd	Signal	EB L	115	25	51	25	55	25	55
			EB T	--	61	200	66	221	69	241
			EB R	--	0	25	0	25	0	12
			WB L	130	25	27	25	29	--	--
			WB T+R	--	608	538	687	606	--	--
			WB L+T+R	--	--	--	--	--	737	715
			NB L+T+R	--	--	--	--	--	25	25
			SB L+T+R	--	182	550	199	613	244	715
3	Wisteria Dr @ Parking Deck	TWSC	WB L	--	--	--	--	--	0	25
			NB L+R	--	--	--	--	--	25	25
4	Wisteria Dr @ Street B	TWSC	WB L	--	--	--	--	--	0	0
			NB L+R	110	--	--	--	--	25	25
5	Wisteria Dr @ Clower St	Existing: TWSC Proposed: AWSC	EB L+T+R	--	--	--	--	--	100	1525
			WB L	--	25	25	25	25	--	--
			WB L+T+R	--	--	--	--	--	1050	650
			NB L+T+R	--	75	125	100	175	25	50
			SB L+T+R	--	--	--	--	--	25	25
6	North Rd @ Parking Deck	TWSC	WB L+R	--	--	--	--	--	0	25
			SB L	--	--	--	--	--	0	0
7	Street B @ Street C	TWSC	WB L+T+R	--	--	--	--	--	0	25
			SB L+T+R	--	--	--	--	--	0	0
8	Clower St @ City Hall Dr/ Street C	TWSC	EB L+T+R	--	0	0	0	0	0	0
			WB L+T+R	--	25	25	25	25	25	25
			NB L+T+R	--	0	0	0	0	0	0
			SB L+T+R	--	25	0	25	0	25	0
9	SR 124 @ Oak Rd	Signal	EB L	230	150	215	156	246	156	246
			EB T	--	180	427	186	495	186	495
			EB R	100	25	172	25	195	25	195
			WB L	145	208	213	217	273	244	424
			WB T	--	314	346	329	375	329	375
			WB R	125	282	167	320	193	338	213
			NB L	240	41	45	47	53	47	61
			NB T	--	937	873	1094	1004	1103	1026
			NB R	140	0	25	0	25	0	47
			SB L	185	50	157	84	252	98	299
			SB T	--	743	801	901	897	901	921
			SB R	165	0	0	0	0	0	0
10	Oak Rd @ North Rd	TWSC	WB L	--	0	0	0	0	--	--
			WB L+T+R	--	--	--	--	--	0	0
			NB L+T+R	--	25	25	25	25	25	25
			SB L+T	--	25	75	25	100	--	--
			SB R	--	25	25	50	25	--	--
			SB L+T+R	--	--	--	--	--	100	325
11	Oak Rd @ Street A	AWSC	EB L+T	--	--	--	--	--	75	475
			WB T+R	--	--	--	--	--	125	200
			SB L+R	--	--	--	--	--	25	25
12	Oak Rd @ Street B	TWSC	EB L	--					0	25
			SB L+R	--					25	25
13	Oak Rd @ Clower St	TWSC	EB L	65	25	25	25	25	25	25
			SB L+R	--	25	50	25	50	25	100
14	Oak Rd @ City Hall Dr	TWSC	EB L	90	0	0	0	0	0	0
			WB L	--	0	0	0	0	0	0
			NB L+T+R	--	0	25	25	25	25	25
			SB L+T	--	25	25	0	25	0	25
			SB R	--	0	25	0	25	0	25
15	US 78 @ Oak Rd	Signal	EB L	150	31	27	33	28	38	46
			EB T	--	220	516	240	576	242	584
			EB R	95	0	0	0	0	0	0
			WB L	175	78	268	82	357	82	364
			WB T	--	193	123	22	132	222	136
			WB R	125	25	25	25	25	25	25
			NB L	140	87	70	95	77	96	78
			NB T	--	558	451	653	509	665	529
			NB R	0	224	920	277	1075	281	1083
			SB L	260 (2)	63	146	68	158	72	168
			SB T+R	--	147	456	157	501	169	546
16	US 78 @ Wisteria Dr	Signal	EB L	175	202	50	294	56	302	64
			EB T+R	--	268	1137	300	1204	304	1196
			WB L	115	25	33	25	35	25	35
			WB T	--	913	552	1050	613	1056	627
			WB R	240	200	120	230	142	241	164
			NB L	270 (2)	153	120	165	128	165	128
			NB T+R	--	406	374	433	401	433	401
			SB L	600 (2)	215	496	237	548	259	598
			SB T+R	--	190	510	204	554	209	573

The BOQ results indicate that several intersections have queues that exceed their storage length:

1. SR 124 at Wisteria Drive: The SR 124 southbound left turn queue is 200 feet in the Existing conditions; however, this queue is expected to increase to 400 feet in the Future With Project conditions. Although the left turn lane is a TWLT lane, this queue would extend past several access points on SR 124. Also, the Wisteria westbound right turn queue is currently 300 feet but is expected to be 450 feet in the Future With Project conditions. A queue of 450 feet would extend through the Wisteria Drive at North Road intersection and potentially disrupt operations at that signal.

2. Wisteria Drive at North Road: The North Road southbound queue is 550 feet long in PM during the Existing conditions. This southbound queue is expected to increase to 715 feet in the PM during the Future With Project conditions, partially due to the changing of North Street from a one-way to a two-way street. Also, the Wisteria westbound queue is expected to extend over 700 feet in the AM and PM peak hours during the Future With Project conditions. A westbound queue over 700 feet would extend close to the Wisteria Drive at Street B intersection.

5. Wisteria Drive at Clower Street: Existing and Future Background queues at this intersection are short - the longest Wisteria Drive queue is 25 feet for the westbound left turn, and the longest Clower Street queue is 175 for the northbound approach. The Future With Project queues are expected to increase substantially on Clower Street due to the changing in intersection control from TWSC to AWSC. The westbound approach queue is expected to be 1050 feet in the AM peak hour while the eastbound approach queue is expected to be 1525 feet in the PM peak hour which would extend to the SR 124 at Wisteria intersection.

9. SR 124 at Oak Road: Several existing turning queues are currently greater than the available storage. The queues that are expected to increase the most from Existing to Future With Project conditions are the Oak Road westbound left turn and right turn movements. The westbound left turn has a storage length of 145 feet with a queue of 213 feet in the PM peak during Existing conditions. This left turn queue is expected to increase to 424 feet during the Future With Project conditions. The westbound right turn has a storage length of 125 feet and a queue of 282 feet in the Existing conditions during the AM peak. This right turn queue is expected to increase to 388 feet during the Future With Project conditions.

10. Oak Road at North Road: No queues are projected to exceed their available storage at this intersection. However, it is worth noting that the southbound queue is expected to increase from 100 feet in the PM peak during the Future Background conditions to 325 feet during the Future With Project conditions. This change in queue length is due to an increase in traffic volume from the development and due to the removal of a southbound turning lane.

11. Oak Road at Street A: This proposed AWSC intersection is projected to have an Oak Road eastbound queue of 475 feet in the PM peak during the Future Background conditions. A 475-foot queue on Oak Road would extend past the Oak Road at North Road intersection.

15. US 78 at Oak Road: The US 78 westbound left turn has 175 feet of marked storage space while the Future With Project queue is expected to be 367 feet in the PM peak hour. However, this is a TWLT lane which extends to Wisteria Drive and has close to 900 feet of available storage.

16. US 78 at Wisteria Drive: The US 78 eastbound left turn has 175 feet of marked storage space while the Future With Project queue is expected to be 302 feet in the PM peak hour. However, this is a TWLT lane which extends to Oak Road and has close to 900 feet of available storage.

6. RECOMMENDATIONS

The results of the capacity analysis and the back of queue (BOQ) analysis indicate that several geometric and intersection control changes should be made to the proposed design. It is worth noting that the proposed improvements on Wisteria Drive and Oak Road are intended to increase walkability and reduce vehicle speeds which may reduce volumes on these two roadways as traffic potentially diverts to US 78 and SR 124. However, for the purposes of this study, it is assumed that traffic volumes on Wisteria Drive and Oak Road will continue to grow at a 2% rate in addition to the traffic generated by the proposed development.

1. SR 124 at Wisteria Drive: The Wisteria Drive westbound right turn and the SR 124 southbound left turn are expected to operate at a LOS F in the Future With Project conditions. In addition, the Wisteria westbound right turn queue is currently 300 feet but is expected to be 450 feet in the Future With Project conditions. A queue of 450 feet would extend through the Wisteria Drive at North Road intersection and potentially disrupt operations at that signal. Improvements at this intersection should be considered if the development is constructed. Gwinnett County has already begun studying improvements at this intersection. The City of Snellville is considering a traffic signal which would likely reduce the Wisteria westbound and SR 124 south left turn queues.

2. Wisteria Drive at North Road: The proposed removal of the Wisteria Drive westbound left turn lane is projected to worsen operations at this signal. The Future With Project conditions show worsening conditions due to the removal of this turn lane, although this likely underestimates the impact of removal of this turn lane. If a westbound left turning vehicle cannot find a gap to turn, then this stopped vehicle would disrupt all westbound traffic. Therefore, it is recommended to have a 75-foot westbound left turn lane. According to the 2023 Future With Project volumes, the westbound left turn would warrant a protected-permissive signal phase.

5. Wisteria Drive at Clower Street: The Clower Street northbound approach currently operates with unacceptable LOS in the Existing conditions. While the conversion of this intersection from TWSC to AWSC is expected to reduce northbound delay, the overall intersection delay is expected to significantly increase. In the 2023 Future With Project conditions, overall intersection delay is expected to be 121s and 224s in the AM and PM peak hours, respectively. In addition, the Wisteria Drive eastbound queue is expected to be 1525 feet in the PM peak hour. Based on the existing and proposed geometry of the intersection, an AWSC is not recommended.

   A mini roundabout is the recommended alternative at Wisteria Drive at Clower Street because it is projected to have improved LOS compared to an AWSC intersection while reducing vehicle speeds in the area. A mini roundabout is projected to have acceptable LOS on all approaches with two exceptions. In the AM, the westbound approach would have a LOS E with a queue of 413 feet. In the PM, the eastbound approach would have a LOS F with a queue of 538 feet. This projected delay and queuing will likely reduce if vehicles stop using Wisteria Drive as a cut-through for SR 124 and US 78.

10. Oak Road at North Road: The North Road southbound approach is proposed to be changed from two turn lanes (one left turn, one right turn) to one lane (one left/right lane). In the 2023 Future With Project conditions, the southbound approach is expected to operate at a LOS F with 128s of delay. If the southbound approach was changed to have two turn lanes, the average approach delay in the PM would be expected to decrease

from 128s to 42s. Therefore, it is recommended to have a left turn/through lane and a right turn lane on the southbound approach.

11. Oak Road at Street A: This proposed AWSC intersection is expected to operate at a LOS E in the 2023 Future With Project conditions in the PM peak hour. In addition, the Oak Road eastbound queue is expected to extend past the Oak Road at North Road intersection. However, future traffic on Oak Road might be reduced if this intersection has an all-way stop and more traffic stops using Oak Road as a cut-through and uses SR 124 and US 78 instead due to the added stop and slower speeds.

13. Oak Road at Clower Street: This intersection currently operates at an acceptable LOS and is projected to continue to operate at an acceptable LOS in the Future Background conditions. The additional traffic generated by the development is expected to worsen the Clower Street southbound approach LOS in the PM from a LOS C in the Future Background Conditions to a LOS E in the Future With Project Conditions.

    If a left turn lane was added on the Clower Road southbound approach, then the approach delay is projected to decrease from LOS E with 37s delay to LOS D with 28s delay. While a southbound left turn lane is preferred, geometric constraints make this left turn lane unfeasible.

    AWSC is the recommended alternative at Oak Road at Clower Street because it will have similar delay as the TWSC while reducing vehicle speeds on Oak Road. In the AM peak hour an AWSC is projected to have acceptable LOS on all approaches. In the PM peak hour an AWSC is projected to have LOS F on the Oak Road eastbound approach with a 95th percentile queue of 400 feet. This projected delay and queuing will likely reduce if vehicles stop using Oak Road as a cut-through for SR 124 and US 78.

7. CONCLUSIONS

The Grove at Towne Center is a multi-use private development to be located on the east side of SR 124 between Wisteria Drive and Oak Road in Snellville, Georgia. A Development of Regional Impact Traffic Study was performed to determine how much new traffic would be generated by the proposed development and how the new traffic would impact the existing roadway network.

The proposed development is on approximately 18 total acres in the City of Snellville. Phase 1 of the project is planned for a site bounded by Scenic Hwy (SR 124) on the west, Oak Road on the south, Clower Street on the east, and Wisteria Drive on the north. Phase 2 is planned for a site across from (on the north side of) Wisteria Drive, and slightly east of, Phase 1. The overall project is proposed to consist of 429 multi-family residential units; 77,000 SF of commercial (a mix of retail and office) space; a 17,000 SF market with 17,000 SF of additional event space on the second floor, 8,200 SF of restaurant space; a 22,500 SF library with 22,500 SF of community space on the second floor; and a new town green.

As part of the project, several geometric changes are proposed in the study area. North Road is proposed to change from a one-way road to a two-way road between Wisteria Drive and Oak Road. North Road would have two lanes with no turn lanes. The existing TWLT lanes on Wisteria Drive and Oak Road are proposed to be eliminated and the right-of-way to be used for bulb-outs and street parking. Finally, there are two proposed AWSC intersections in the study area. The existing Wisteria Drive at Clower Street intersection is proposed to be converted from TWSC to AWSC, and the new Oak Road at Street A intersection is proposed to become an AWSC intersection.

A Trip Generation analysis was performed to determine the volume of traffic that would be generated by the proposed development. The project is expected to generate a net of 8,162 new trips per day, with 203 new trips occurring during the morning peak hour, and 765 new trips occurring during the evening peak hour. While the study assumes future traffic volumes will increase based on demand for the proposed development and population growth, the overall tenor of the area will change and likely encourage drivers to avoid using these roadways as a cut-through, particularly on Wisteria Drive and Oak Road.

Capacity analysis was performed for the Future Background and Future With Project peak hour conditions. LOS D or better was considered adequate. Several intersections have inadequate LOS, including: SR 124 at Wisteria Drive, Wisteria Drive at North Road, Wisteria Drive at Clower Street, SR 124 at Oak Road, Oak Road at North Road, Oak Road at Street A, Oak Road at Clower Street, and US 78 at Wisteria Drive.

A Back of Queue analysis indicated that several intersections have existing or potential queuing problems: SR 124 at Wisteria Drive, Wisteria Drive at North Road, Wisteria Drive at Clower Street, SR 124 at Oak Road, Oak Road at North Road, Oak Road at Street A, US 78 at Oak Road, and US 78 at Wisteria Drive.

Recommendations for changes to the intersection control or geometry include: improvements to SR 124 at Wisteria Drive, addition of a westbound left turn lane at Wisteria Drive at North Road, intersection control change at Wisteria Drive at Clower Street from AWSC to a mini roundabout, addition of a southbound left turn lane at Oak Road at North Road, and intersection control change at Oak Road at Clower Street from TWSC to AWSC.

References

1. Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC, 2017.

2. Trip Generation Handbook, 3rd Edition, Institute of Transportation Engineers, Washington, DC, 2014.

3. Highway Capacity Manual, 6th Edition, Transportation Research Board, Washington, DC, 2016.

4. Highway Capacity Software, Version 7.7, McTrans, Gainesville, FL, 2018.

5. Synchro, Version 9, Trafficware Ltd., Sugar Land, TX 2014.

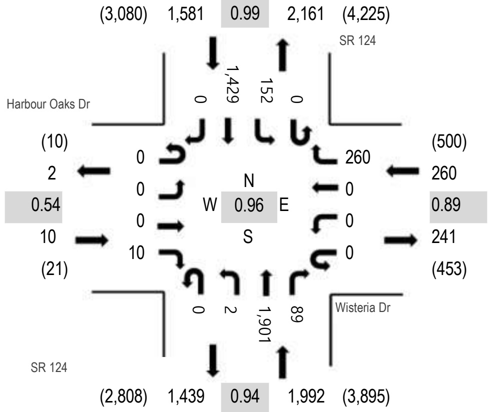
APPENDIX A :

TRAFFIC COUNTS

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

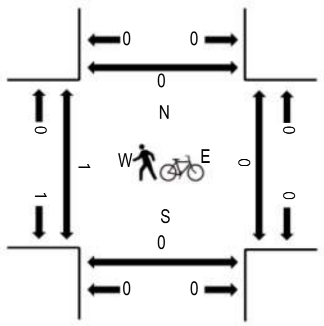
Location: #1 SR 124 & Wisteria Dr AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 07:15 AM - 08:15 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Harbour Oaks Dr Eastbound				Wisteria Dr Westbound				SR 124 Northbound				SR 124 Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	0	6	0	0	0	78	0	0	469	12	0	34	317	2	918	3,841	1	0	0	0
7:15 AM	0	0	0	3	0	0	0	65	0	1	496	16	0	33	356	0	970	3,843	1	0	0	0
7:30 AM	0	0	0	2	0	0	0	70	0	0	508	25	0	39	361	0	1,005	3,777	0	0	0	0
7:45 AM	0	0	0	2	0	0	0	65	0	0	462	24	0	44	351	0	948	3,703	0	0	0	0
8:00 AM	0	0	0	3	0	0	0	60	0	1	435	24	0	36	361	0	920	3,655	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	55	0	0	428	20	0	32	368	1	904		0	0	0	0
8:30 AM	0	1	0	3	0	0	0	54	0	2	465	21	0	29	355	1	931		0	0	0	0
8:45 AM	0	0	0	1	0	0	0	53	0	0	461	25	0	39	319	2	900		0	0	0	0

Peak Rolling Hour Flow Rates

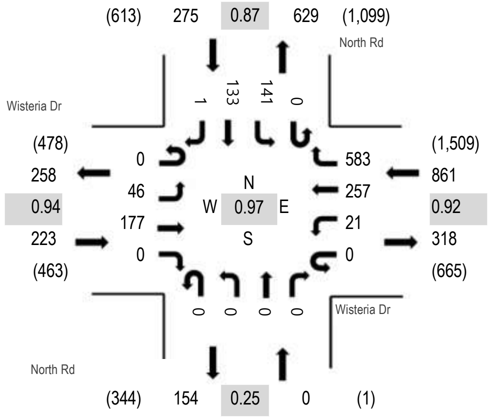
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	2	0	0	21	0	0	1	11	0	35
Lights	0	0	0	10	0	0	0	253	0	2	1,834	89	0	149	1,373	0	3,710
Mediums	0	0	0	0	0	0	0	5	0	0	46	0	0	2	45	0	98
Total	0	0	0	10	0	0	0	260	0	2	1,901	89	0	152	1,429	0	3,843

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

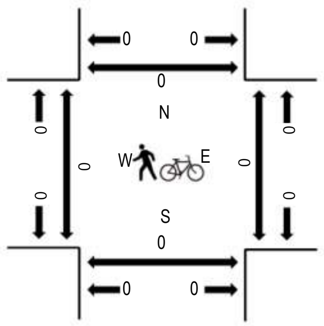
Location: #2 North Rd & Wisteria Dr AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Wisteria Dr Eastbound				Wisteria Dr Westbound				North Rd Northbound				North Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	8	43	0	0	2	70	163	0	0	0	0	0	25	34	1	346	1,359	0	0	0	0
7:15 AM	0	9	34	0	0	4	65	153	0	0	0	0	0	37	22	0	324	1,335	0	0	0	0
7:30 AM	0	19	47	0	0	6	60	126	0	0	0	0	0	38	43	0	339	1,306	0	0	0	0
7:45 AM	0	10	53	0	0	9	62	141	0	0	0	0	0	41	34	0	350	1,266	0	0	0	0
8:00 AM	0	15	47	0	0	6	58	123	0	0	0	0	0	35	37	1	322	1,227	0	0	0	0
8:15 AM	0	11	42	4	0	5	47	100	0	0	0	1	0	35	48	2	295		0	0	0	0
8:30 AM	0	9	45	2	0	4	53	103	0	0	0	0	0	42	38	3	299		0	0	0	0
8:45 AM	0	19	45	1	0	4	55	90	0	0	0	0	0	55	41	1	311		0	1	0	0

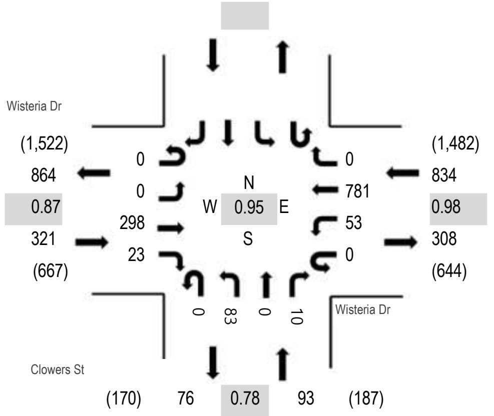
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Lights	0	45	173	0	0	21	254	573	0	0	0	0	0	139	132	1	1,338
Mediums	0	1	2	0	0	0	3	10	0	0	0	0	0	2	1	0	19
Total	0	46	177	0	0	21	257	583	0	0	0	0	0	141	133	1	1,359

(303) 216-2439
www.alltrafficdata.net

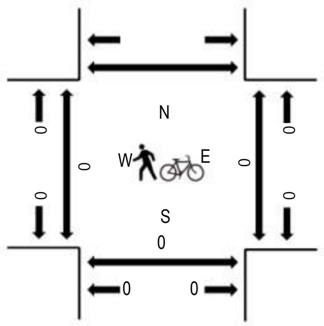
Location: #3 Clowers St & Wisteria Dr AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Wisteria Dr Eastbound U-Turn	Left	Thru	Right	Wisteria Dr Westbound U-Turn	Left	Thru	Right	Clowers St Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	0	58	3	0	6	207	0	0	24	0	0					298	1,248	0	0	0	
7:15 AM	0	0	77	3	0	15	196	0	0	24	0	4					319	1,238	0	0	0	
7:30 AM	0	0	72	9	0	15	185	0	0	19	0	3					303	1,171	0	0	0	
7:45 AM	0	0	91	8	0	17	193	0	0	16	0	3					328	1,132	0	0	0	
8:00 AM	0	0	79	6	0	10	173	0	0	13	0	7					288	1,088	0	0	0	
8:15 AM	0	0	73	8	0	11	140	0	0	17	0	3					252		0	0	0	
8:30 AM	0	0	64	16	0	13	147	0	0	17	0	7					264		0	0	0	
8:45 AM	0	0	88	12	0	18	136	0	0	15	0	15					284		0	0	0	

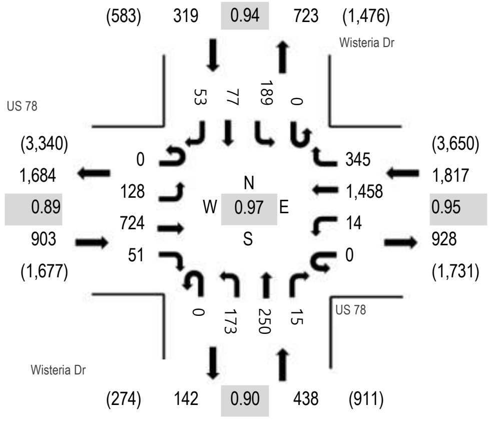
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	3	0	0	0	0	0	0	0	0	0					3
Lights	0	0	292	23	0	53	769	0	0	83	0	10					1,230
Mediums	0	0	3	0	0	0	12	0	0	0	0	0					15
Total	0	0	298	23	0	53	781	0	0	83	0	10					1,248

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

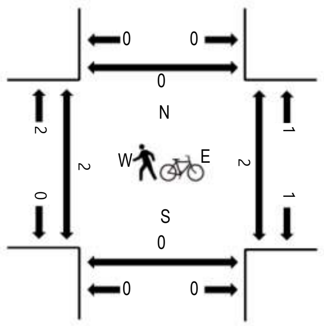
Location: #4 Wisteria Dr & US 78 AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 08:15 AM - 08:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 78 Eastbound				US 78 Westbound				Wisteria Dr Northbound				Wisteria Dr Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	31	142	9	0	11	387	103	0	49	77	9	0	46	13	4	881	3,459	0	4	1	0
7:15 AM	0	33	125	7	0	6	388	102	0	44	76	4	0	37	21	9	852	3,434	0	2	1	0
7:30 AM	0	36	176	6	0	6	349	87	0	41	63	2	0	49	16	8	839	3,477	0	0	0	0
7:45 AM	0	30	183	11	0	3	360	95	0	40	75	7	0	54	17	12	887	3,450	2	1	0	0
8:00 AM	0	33	159	13	0	2	365	90	0	49	58	2	0	45	23	17	856	3,362	0	1	0	0
8:15 AM	0	29	206	21	0	3	384	73	0	43	54	4	0	41	21	16	895		0	0	0	0
8:30 AM	0	24	182	19	0	3	338	70	0	46	70	2	0	33	16	9	812		0	0	0	0
8:45 AM	0	29	163	10	0	2	339	84	0	34	54	8	0	52	15	9	799		0	0	0	0

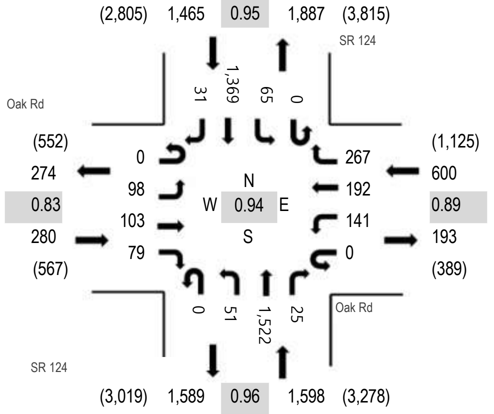
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	10	1	0	0	18	2	0	1	0	0	0	0	1	0	33
Lights	0	127	687	42	0	12	1,428	335	0	165	249	15	0	185	73	52	3,370
Mediums	0	1	27	8	0	2	12	8	0	7	1	0	0	4	3	1	74
Total	0	128	724	51	0	14	1,458	345	0	173	250	15	0	189	77	53	3,477

All Traffic Data
Services Inc.
(303) 216-2439
www.alltrafficdata.net

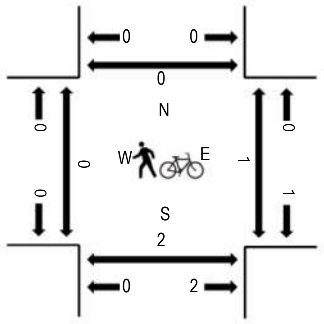
Location: #5 SR 124 & Oak Rd AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound U-Turn	Left	Thru	Right	Oak Rd Westbound U-Turn	Left	Thru	Right	SR 124 Northbound U-Turn	Left	Thru	Right	SR 124 Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	13	27	18	0	28	42	60	0	20	397	1	0	15	305	13	939	3,903	0	0	0	0
7:15 AM	0	22	18	31	0	22	39	60	0	19	411	3	0	10	309	16	960	3,917	1	0	0	0
7:30 AM	0	22	22	16	0	37	49	79	0	12	423	4	0	11	371	3	1,049	3,943	0	0	0	0
7:45 AM	0	30	24	19	0	32	46	56	0	16	372	6	0	17	331	6	955	3,859	0	0	2	0
8:00 AM	0	18	30	17	0	37	52	79	0	10	357	4	0	17	322	10	953	3,872	0	0	0	0
8:15 AM	0	28	27	27	0	35	45	53	0	13	370	11	0	20	345	12	986		0	0	0	0
8:30 AM	0	19	29	18	0	38	35	68	0	15	396	7	0	17	315	8	965		0	0	0	0
8:45 AM	0	31	39	22	0	24	51	58	0	10	393	8	0	22	300	10	968		0	0	0	0

Peak Rolling Hour Flow Rates

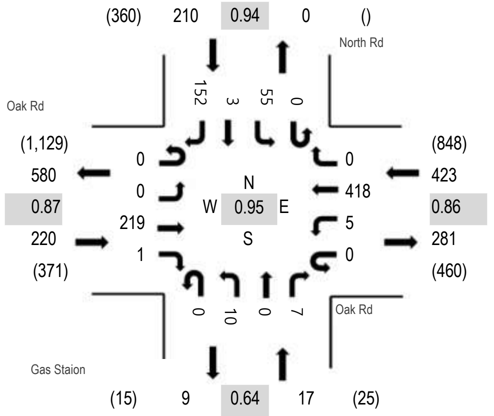
Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	1	1	0	0	2	2	0	0	19	1	0	0	19	1	46
Lights	0	96	100	75	0	140	187	259	0	51	1,457	23	0	63	1,306	28	3,785
Mediums	0	2	2	3	0	1	3	6	0	0	46	1	0	2	44	2	112
Total	0	98	103	79	0	141	192	267	0	51	1,522	25	0	65	1,369	31	3,943

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

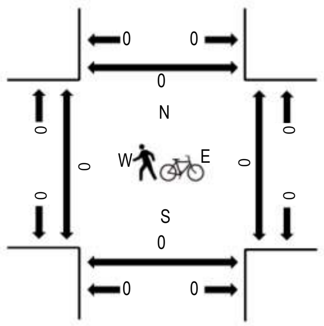
Location: #6 Gas Staion & Oak Rd AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:00 AM - 08:15 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound				Oak Rd Westbound				Gas Staion Northbound				North Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	34	0	0	0	97	0	0	2	0	1	0	3	2	31	170	734	0	0	0	0
7:15 AM	0	0	30	0	0	0	106	0	0	1	0	0	0	9	0	19	165	793	0	0	0	0
7:30 AM	0	0	38	0	0	0	134	0	0	0	0	0	0	10	2	35	219	842	0	0	0	0
7:45 AM	0	0	49	0	0	1	87	0	0	2	0	2	0	3	1	35	180	829	0	1	2	0
8:00 AM	0	0	49	0	0	0	132	0	0	1	0	3	0	6	1	37	229	870	0	0	0	0
8:15 AM	0	0	55	0	0	4	96	0	0	2	0	1	0	14	1	41	214		0	0	0	0
8:30 AM	0	0	52	1	0	1	89	0	0	5	0	2	0	16	1	39	206		0	0	0	0
8:45 AM	0	0	63	0	0	0	101	0	0	2	0	1	0	19	0	35	221		0	0	0	0

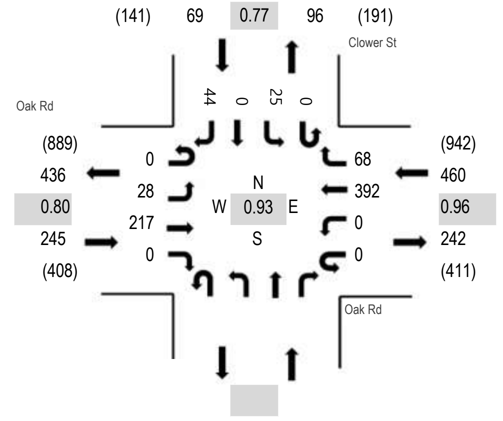
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Lights	0	0	215	0	0	5	412	0	0	9	0	7	0	54	3	149	854
Mediums	0	0	4	1	0	0	4	0	0	1	0	0	0	1	0	3	14
Total	0	0	219	1	0	5	418	0	0	10	0	7	0	55	3	152	870

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

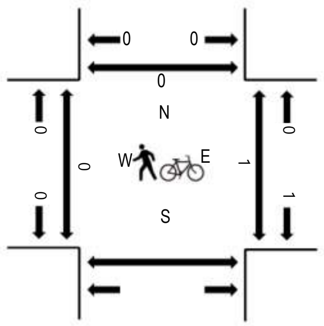
Location: #7 Clower St & Oak Rd AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:45 AM - 09:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound U-Turn	Left	Thru	Right	Oak Rd Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Clower St Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	2	42	0	0	0	90	25					0	3	0	5	167	717	0	0		0
7:15 AM	0	5	30	0	0	0	111	17					0	3	0	15	181	737	0	0		0
7:30 AM	0	3	37	0	0	0	94	28					0	9	0	13	184	737	0	0		0
7:45 AM	0	7	37	0	0	0	109	8					0	8	0	16	185	751	0	0		1
8:00 AM	0	5	46	0	0	0	113	13					0	3	0	7	187	774	0	0		0
8:15 AM	0	4	58	0	0	0	85	20					0	2	0	12	181		0	0		0
8:30 AM	0	6	49	0	0	0	104	15					0	10	0	14	198		0	1		0
8:45 AM	0	13	64	0	0	0	90	20					0	10	0	11	208		0	0		0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	1	0					0	0	0	0	1
Lights	0	28	211	0	0	0	384	68					0	24	0	42	757
Mediums	0	0	6	0	0	0	7	0					0	1	0	2	16
Total	0	28	217	0	0	0	392	68					0	25	0	44	774

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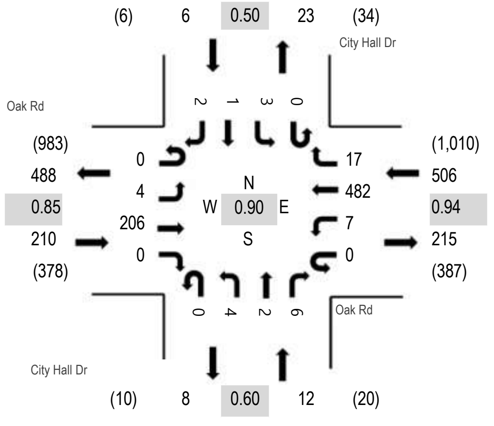
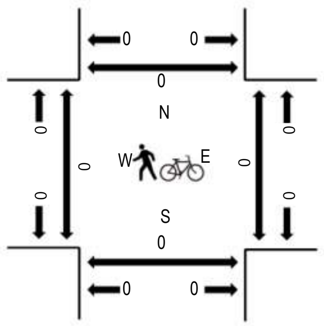
Location: #8 City Hall Dr & Oak Rd AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:45 AM - 09:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound				Oak Rd Westbound				City Hall Dr Northbound				City Hall Dr Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	39	0	0	0	114	2	0	1	0	1	0	0	0	0	157	680	0	0	0	0
7:15 AM	0	0	34	0	0	1	136	2	0	1	0	0	0	0	0	0	174	705	0	0	0	0
7:30 AM	0	0	47	1	0	0	122	2	0	1	0	1	0	0	0	0	174	704	0	0	0	0
7:45 AM	0	0	47	0	0	0	120	5	0	0	0	3	0	0	0	0	175	705	0	0	0	1
8:00 AM	0	0	46	0	0	2	129	3	0	1	0	0	0	0	1	0	182	734	0	0	0	0
8:15 AM	0	0	52	0	0	0	114	3	0	1	1	1	0	1	0	0	173		0	0	0	0
8:30 AM	0	0	50	0	0	1	118	2	0	1	1	1	0	0	0	1	175		0	0	0	0
8:45 AM	0	4	58	0	0	4	121	9	0	1	0	4	0	2	0	1	204		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Lights	0	4	201	0	0	7	475	16	0	4	2	6	0	3	1	2	721
Mediums	0	0	5	0	0	0	6	1	0	0	0	0	0	0	0	0	12
Total	0	4	206	0	0	7	482	17	0	4	2	6	0	3	1	2	734

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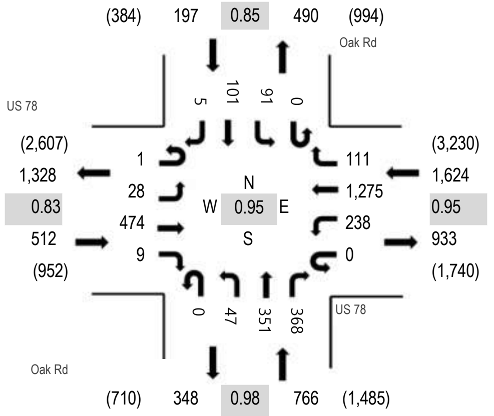
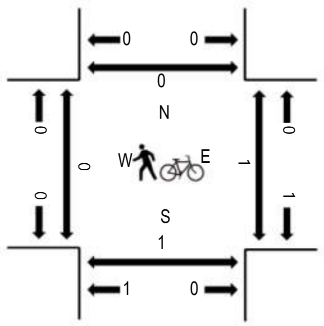
Location: #9 Oak Rd & US 78 AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 78 Eastbound				US 78 Westbound				Oak Rd Northbound				Oak Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	1	3	76	1	0	67	346	23	0	10	88	88	0	20	19	1	743	3,049	0	0	0	0
7:15 AM	1	7	109	3	0	52	316	32	0	20	94	75	0	12	21	1	743	3,054	0	0	0	0
7:30 AM	1	11	103	1	0	57	308	21	0	13	93	94	0	22	27	0	751	3,099	0	0	0	0
7:45 AM	0	8	128	2	0	55	346	28	0	9	89	98	0	25	22	2	812	3,083	0	1	0	0
8:00 AM	0	4	95	4	0	67	309	28	0	11	96	89	0	18	26	1	748	3,002	0	0	0	0
8:15 AM	0	5	148	2	0	59	312	34	0	14	73	87	0	26	26	2	788		0	0	1	0
8:30 AM	0	12	102	1	0	66	291	30	1	9	80	92	0	17	33	1	735		0	0	0	0
8:45 AM	1	13	107	3	0	63	274	46	0	6	76	80	0	29	32	1	731		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	11	0	0	0	16	3	0	0	1	0	0	1	0	0	32
Lights	1	28	444	9	0	233	1,242	107	0	43	346	356	0	87	101	4	3,001
Mediums	0	0	19	0	0	5	17	1	0	4	4	12	0	3	0	1	66
Total	1	28	474	9	0	238	1,275	111	0	47	351	368	0	91	101	5	3,099

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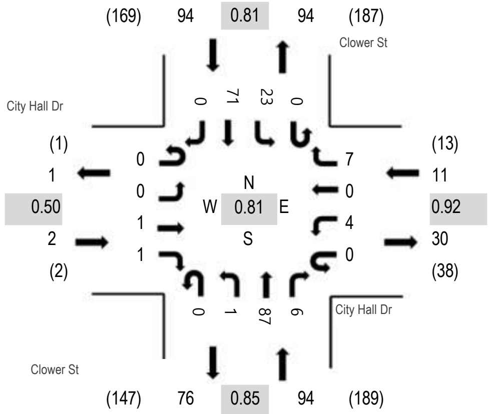
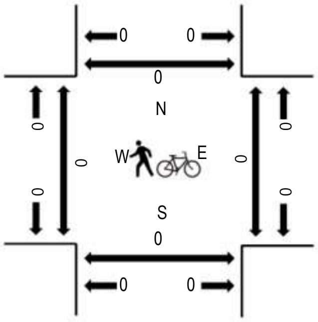
Location: #10 Clower St & City Hall Dr AM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:45 AM - 09:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	City Hall Dr Eastbound U-Turn	Left	Thru	Right	City Hall Dr Westbound U-Turn	Left	Thru	Right	Clower St Northbound U-Turn	Left	Thru	Right	Clower St Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
7:00 AM	0	0	0	0	0	0	0	0	0	0	24	1	0	0	9	0	34	172	0	0	0	0
7:15 AM	0	0	0	0	0	1	0	0	0	0	28	0	0	1	16	0	46	178	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	22	0	0	2	23	0	47	174	0	0	0	0
7:45 AM	0	0	0	0	0	1	0	0	0	0	19	1	0	3	21	0	45	184	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	3	0	0	18	1	0	4	14	0	40	201	0	0	0	0
8:15 AM	0	0	0	1	0	1	0	1	0	0	18	2	0	7	12	0	42		0	0	0	0
8:30 AM	0	0	1	0	0	0	0	3	0	1	22	2	0	4	24	0	57		0	0	0	0
8:45 AM	0	0	0	0	0	3	0	0	0	0	29	1	0	8	21	0	62		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	1	1	0	2	0	7	0	1	87	6	0	23	70	0	198
Mediums	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	3
Total	0	0	1	1	0	4	0	7	0	1	87	6	0	23	71	0	201

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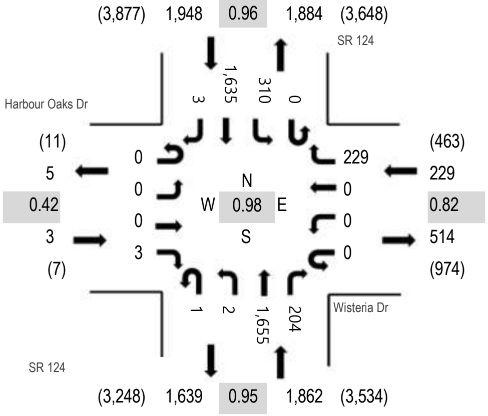
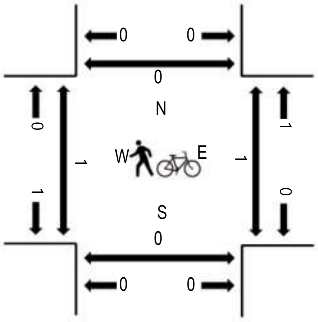
Location: #1 SR 124 & Wisteria Dr PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:30 PM - 05:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Harbour Oaks Dr Eastbound U-Turn	Left	Thru	Right	Wisteria Dr Westbound U-Turn	Left	Thru	Right	SR 124 Northbound U-Turn	Left	Thru	Right	SR 124 Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
4:00 PM	0	0	0	0	0	0	0	53	0	0	371	33	0	83	410	2	952	3,866	0	0	0	0
4:15 PM	0	0	0	1	0	0	0	54	0	0	400	35	1	67	371	1	930	3,926	1	0	0	0
4:30 PM	0	0	0	3	0	0	0	77	0	0	373	34	0	84	429	1	1,001	4,016	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	61	0	0	393	45	0	84	399	1	983	4,042	0	1	0	0
5:00 PM	0	0	0	1	0	0	0	58	0	1	419	56	0	72	405	0	1,012	4,015	1	0	0	0
5:15 PM	0	0	0	1	0	0	0	58	0	0	401	56	0	79	424	1	1,020		0	0	0	0
5:30 PM	0	0	0	1	0	0	0	52	1	1	442	47	0	75	407	1	1,027		0	0	0	0
5:45 PM	0	0	0	0	0	0	0	50	0	0	385	41	0	83	395	2	956		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	11	1	0	0	12	0	24
Lights	0	0	0	3	0	0	0	224	1	2	1,623	202	0	305	1,597	3	3,960
Mediums	0	0	0	0	0	0	0	5	0	0	21	1	0	5	26	0	58
Total	0	0	0	3	0	0	0	229	1	2	1,655	204	0	310	1,635	3	4,042

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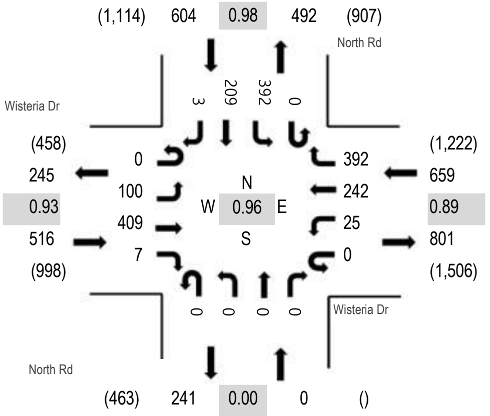
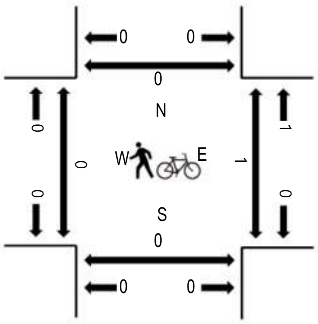
Location: #2 North Rd & Wisteria Dr PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Wisteria Dr Eastbound				Wisteria Dr Westbound				North Rd Northbound				North Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	19	108	2	0	9	50	81	0	0	0	0	0	72	45	3	389	1,656	0	0	0	0
4:15 PM	0	14	89	2	0	5	61	60	0	0	0	0	0	79	57	1	368	1,690	0	0	0	0
4:30 PM	0	22	100	5	0	10	64	83	0	0	0	0	0	108	45	0	437	1,779	0	0	0	0
4:45 PM	0	20	102	1	0	7	74	104	0	0	0	0	0	96	58	0	462	1,728	0	0	0	0
5:00 PM	0	26	102	0	0	5	46	98	0	0	0	0	0	89	56	1	423	1,678	0	1	0	0
5:15 PM	0	32	105	1	0	3	58	107	0	0	0	0	0	99	50	2	457		0	0	0	0
5:30 PM	0	28	92	3	0	5	51	99	0	0	0	0	0	73	35	0	386		0	1	0	0
5:45 PM	0	23	98	4	0	4	47	91	0	0	0	0	0	94	51	0	412		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Lights	0	100	402	7	0	25	236	390	0	0	0	0	0	387	207	3	1,757
Mediums	0	0	6	0	0	0	6	2	0	0	0	0	0	5	2	0	21
Total	0	100	409	7	0	25	242	392	0	0	0	0	0	392	209	3	1,779

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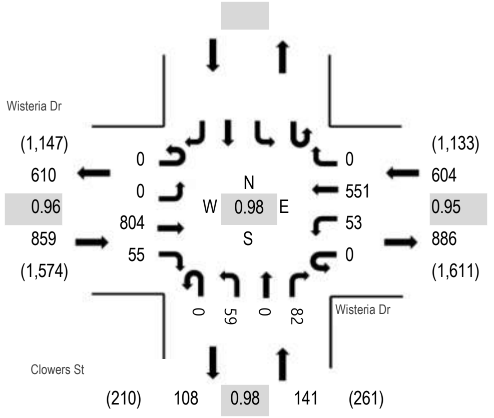
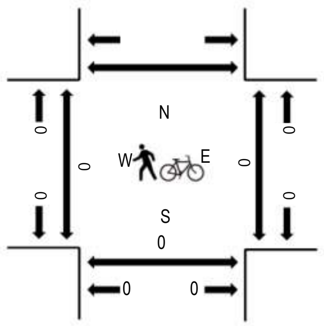
Location: #3 Clowers St & Wisteria Dr PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Wisteria Dr Eastbound				Wisteria Dr Westbound				Clowers St Northbound				Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	172	15	0	9	116	0	0	15	0	20					347	1,476	0	0	0	
4:15 PM	0	0	158	13	0	12	111	0	0	7	0	21					322	1,532	0	0	0	
4:30 PM	0	0	208	15	0	13	127	0	0	17	0	19					399	1,604	0	0	0	
4:45 PM	0	0	197	13	0	10	152	0	0	19	0	17					408	1,551	0	0	0	
5:00 PM	0	0	201	19	0	16	134	0	0	14	0	19					403	1,492	0	0	0	
5:15 PM	0	0	198	8	0	14	138	0	0	9	0	27					394		0	0	0	
5:30 PM	0	0	151	14	0	19	135	0	0	15	0	12					346		0	0	0	
5:45 PM	0	0	178	14	0	6	121	0	0	17	0	13					349		0	0	0	

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	1	0	0	0	0	0	0	0	0	0					1
Lights	0	0	792	55	0	53	543	0	0	59	0	82					1,584
Mediums	0	0	11	0	0	0	8	0	0	0	0	0					19
Total	0	0	804	55	0	53	551	0	0	59	0	82					1,604

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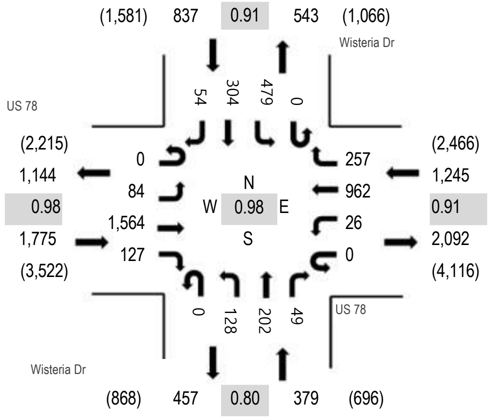
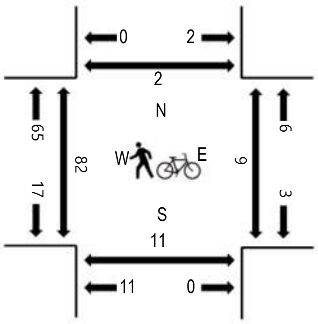
Location: #4 Wisteria Dr & US 78 PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 78 Eastbound U-Turn	Left	Thru	Right	US 78 Westbound U-Turn	Left	Thru	Right	Wisteria Dr Northbound U-Turn	Left	Thru	Right	Wisteria Dr Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
4:00 PM	0	23	385	24	0	5	189	73	0	28	42	13	0	114	58	14	968	4,047	2	1	1	0
4:15 PM	0	19	399	27	0	7	229	63	0	28	35	13	0	106	46	10	982	4,120	8	3	0	1
4:30 PM	0	28	359	29	0	10	273	65	0	31	43	8	0	116	82	13	1,057	4,224	1	2	2	0
4:45 PM	0	24	356	30	0	15	225	76	0	19	52	8	0	124	90	21	1,040	4,236	6	3	0	0
5:00 PM	0	25	396	36	0	7	232	55	0	27	53	11	0	114	74	11	1,041	4,218	15	0	4	0
5:15 PM	0	18	393	33	0	2	250	62	0	49	51	18	0	124	78	8	1,086		42	2	4	2
5:30 PM	0	17	419	28	0	2	255	64	0	33	46	12	0	117	62	14	1,069		19	4	3	0
5:45 PM	0	21	394	39	0	6	229	72	0	23	39	14	0	103	78	4	1,022		9	1	0	1

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	8	0	0	0	10	0	0	0	0	0	0	1	0	0	19
Lights	0	84	1,532	109	0	26	938	253	0	127	199	49	0	476	294	54	4,141
Mediums	0	0	24	18	0	0	14	4	0	1	3	0	0	2	10	0	76
Total	0	84	1,564	127	0	26	962	257	0	128	202	49	0	479	304	54	4,236

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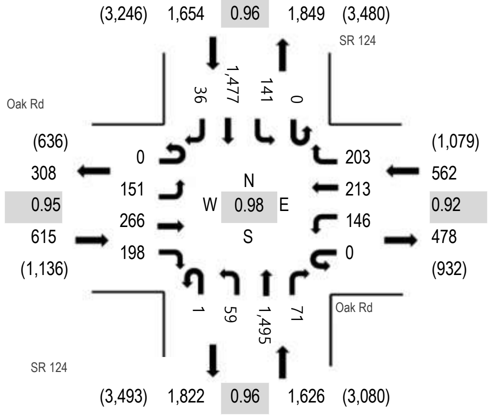
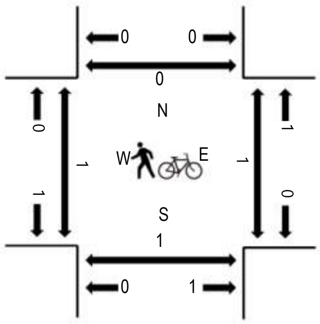
Location: #5 SR 124 & Oak Rd PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound U-Turn	Left	Thru	Right	Oak Rd Westbound U-Turn	Left	Thru	Right	SR 124 Northbound U-Turn	Left	Thru	Right	SR 124 Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
4:00 PM	0	24	61	28	0	31	47	37	0	16	327	15	0	34	359	12	991	4,096	2	0	0	1
4:15 PM	0	29	54	41	0	30	47	58	0	27	326	14	0	33	308	6	973	4,235	0	0	1	0
4:30 PM	0	25	57	36	0	40	45	45	0	24	341	9	0	54	368	20	1,064	4,401	1	0	1	0
4:45 PM	0	40	63	44	0	47	42	50	1	12	350	18	0	34	356	11	1,068	4,457	1	0	0	0
5:00 PM	0	42	62	50	0	32	51	48	0	18	385	14	0	44	376	8	1,130	4,445	0	0	0	0
5:15 PM	0	34	70	56	0	33	54	52	0	16	362	27	0	35	391	9	1,139		0	0	0	0
5:30 PM	0	35	71	48	0	34	66	53	0	13	398	12	0	28	354	8	1,120		0	1	1	0
5:45 PM	0	38	71	57	0	26	48	63	0	18	318	19	0	33	347	18	1,056		0	0	0	0

Peak Rolling Hour Flow Rates

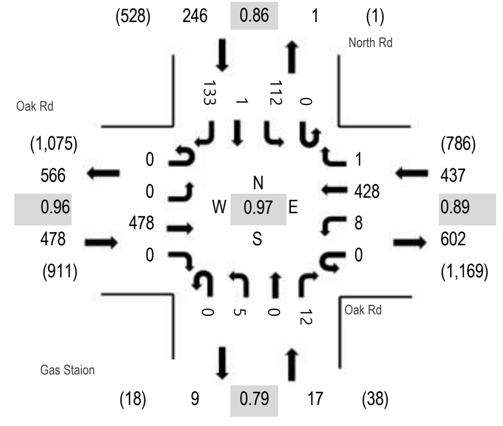
Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	1	0	0	0	1	0	0	0	12	0	0	2	9	0	25
Lights	0	150	259	196	0	145	210	201	1	58	1,462	71	0	135	1,446	36	4,370
Mediums	0	1	6	2	0	1	2	2	0	1	21	0	0	4	22	0	62
Total	0	151	266	198	0	146	213	203	1	59	1,495	71	0	141	1,477	36	4,457

All Traffic Data
Services Inc.

(303) 216-2439
www.alltrafficdata.net

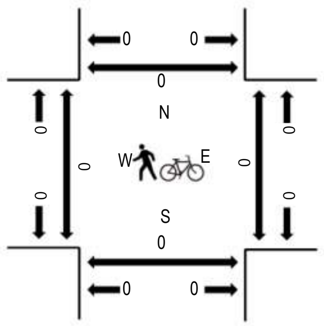
Location: #6 Gas Staion & Oak Rd PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound				Oak Rd Westbound				Gas Staion Northbound				North Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	107	0	0	0	68	0	0	3	0	3	0	29	0	39	249	1,085	0	0	0	0
4:15 PM	1	0	91	1	0	1	98	0	0	1	0	2	0	30	1	30	256	1,121	0	0	0	0
4:30 PM	0	0	117	1	0	0	95	0	0	3	0	4	0	32	2	36	290	1,169	0	0	0	0
4:45 PM	0	0	115	0	0	2	85	0	0	3	0	2	0	35	1	47	290	1,170	0	0	0	0
5:00 PM	0	0	116	0	0	3	96	1	0	1	0	3	0	25	1	39	285	1,178	0	0	0	0
5:15 PM	0	0	124	0	0	2	104	0	0	2	0	4	0	33	0	35	304		0	0	0	0
5:30 PM	0	0	114	0	0	1	122	0	0	1	0	1	0	24	0	28	291		0	0	0	0
5:45 PM	0	0	124	0	0	2	106	0	0	1	0	4	0	30	0	31	298		0	0	0	0

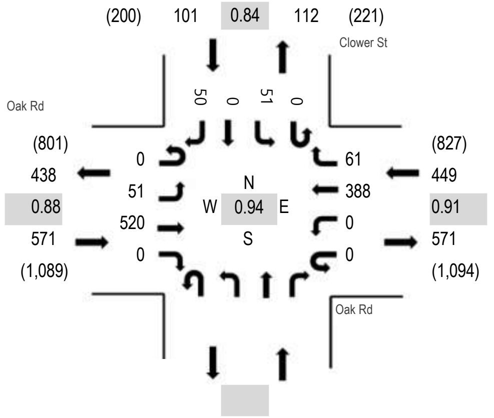
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Lights	0	0	465	0	0	8	421	1	0	5	0	12	0	111	1	133	1,157
Mediums	0	0	10	0	0	0	6	0	0	0	0	0	0	1	0	0	17
Total	0	0	478	0	0	8	428	1	0	5	0	12	0	112	1	133	1,178

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

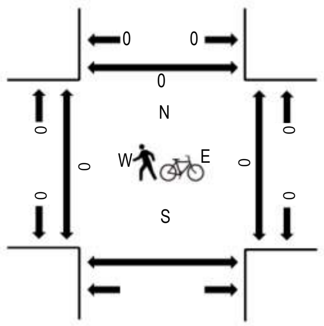
Location: #7 Clower St & Oak Rd PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound U-Turn	Left	Thru	Right	Oak Rd Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Clower St Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrain Crossings West	East	South	North
4:00 PM	0	16	116	0	0	0	74	12					0	15	0	6	239	995	0	0		0
4:15 PM	0	19	98	0	0	0	102	9					0	12	0	11	251	1,025	0	0		0
4:30 PM	0	12	128	0	0	0	76	15					0	16	0	12	259	1,071	0	0		0
4:45 PM	0	10	119	0	0	0	74	16					0	19	0	8	246	1,103	0	0		0
5:00 PM	0	13	121	0	0	0	89	13					0	18	0	15	269	1,121	0	0		0
5:15 PM	0	18	145	0	0	0	97	18					0	7	0	12	297		0	0		0
5:30 PM	0	7	131	0	0	0	109	14					0	15	0	15	291		0	0		0
5:45 PM	0	13	123	0	0	0	93	16					0	11	0	8	264		0	0		0

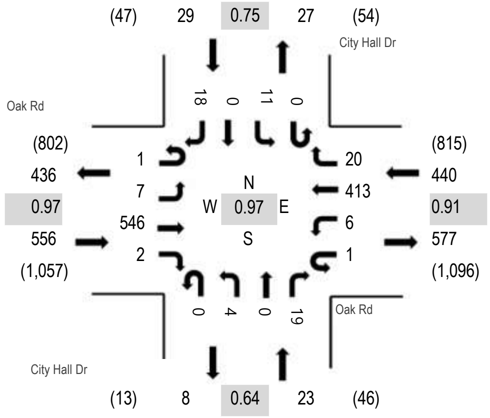
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound U-Turn	Left	Thru	Right	Westbound U-Turn	Left	Thru	Right	Northbound U-Turn	Left	Thru	Right	Southbound U-Turn	Left	Thru	Right	Total
Articulated Trucks	0	0	2	0	0	0	2	0					0	0	0	0	4
Lights	0	50	507	0	0	0	381	61					0	51	0	50	1,100
Mediums	0	1	11	0	0	0	5	0					0	0	0	0	17
Total	0	51	520	0	0	0	388	61					0	51	0	50	1,121

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

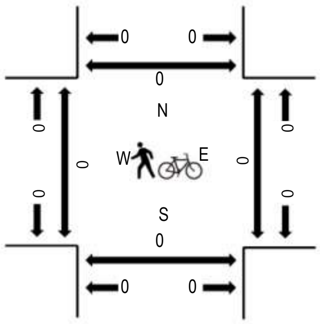
Location: #8 City Hall Dr & Oak Rd PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:30 PM - 05:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Oak Rd Eastbound				Oak Rd Westbound				City Hall Dr Northbound				City Hall Dr Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	1	107	1	0	0	73	5	0	1	0	6	0	3	0	2	199	917	0	0	0	0
4:15 PM	0	1	116	0	0	3	103	6	0	2	0	3	0	2	0	2	238	971	0	0	0	0
4:30 PM	0	2	139	0	0	0	92	5	0	0	0	5	0	2	0	3	248	998	1	0	0	0
4:45 PM	0	3	130	1	0	0	84	4	0	2	0	4	0	2	0	2	232	1,021	0	0	0	0
5:00 PM	1	3	140	1	0	0	89	4	0	1	0	4	0	2	0	8	253	1,048	0	0	0	0
5:15 PM	0	2	137	1	1	2	106	4	0	1	0	4	0	2	0	5	265		0	0	0	0
5:30 PM	0	0	137	0	0	1	115	5	0	0	0	4	0	5	0	4	271		0	0	0	0
5:45 PM	0	2	132	0	0	3	103	7	0	2	0	7	0	2	0	1	259		0	0	0	0

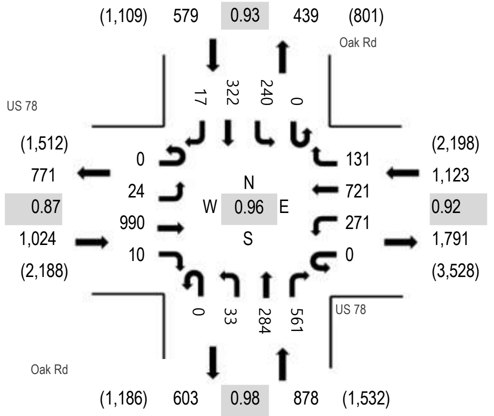
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	4
Lights	1	7	536	2	1	6	405	20	0	4	0	19	0	11	0	18	1,030
Mediums	0	0	8	0	0	0	6	0	0	0	0	0	0	0	0	0	14
Total	1	7	546	2	1	6	413	20	0	4	0	19	0	11	0	18	1,048

All Traffic Data
Services Inc.
(303) 216-2439
www.alltrafficdata.net

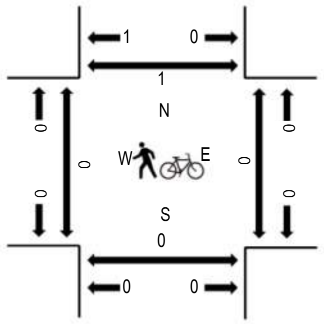
Location: #9 Oak Rd & US 78 PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:30 PM - 05:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	US 78 Eastbound				US 78 Westbound				Oak Rd Northbound				Oak Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	1	6	323	4	0	50	146	29	0	4	37	85	0	41	78	4	808	3,423	0	0	0	0
4:15 PM	2	3	300	8	0	69	170	41	0	8	63	108	0	50	66	4	892	3,510	0	0	0	0
4:30 PM	0	8	262	2	0	75	189	33	0	5	55	115	0	59	83	5	891	3,514	0	0	0	1
4:45 PM	0	6	235	4	0	66	190	17	0	9	64	101	0	58	78	4	832	3,564	0	0	0	0
5:00 PM	0	8	267	3	0	59	176	27	0	9	65	141	0	57	78	5	895	3,604	0	0	0	1
5:15 PM	0	3	223	4	0	71	204	35	0	11	68	139	0	58	77	3	896		0	0	0	0
5:30 PM	0	6	261	3	0	67	186	39	0	8	76	140	0	61	91	3	941		0	0	0	0
5:45 PM	0	7	239	0	0	74	155	30	0	5	75	141	0	64	76	6	872		0	0	0	0

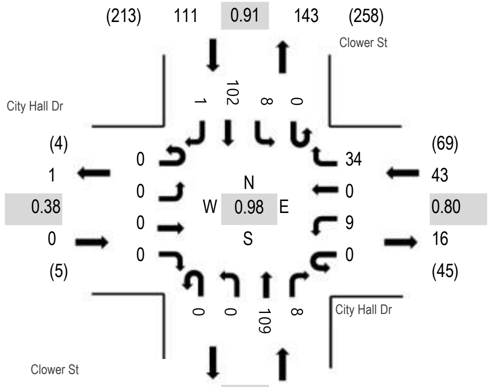
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	4	0	0	0	8	1	0	0	1	0	0	0	1	0	15
Lights	0	24	970	10	0	271	708	128	0	30	280	549	0	231	320	17	3,538
Mediums	0	0	16	0	0	0	5	2	0	3	3	12	0	9	1	0	51
Total	0	24	990	10	0	271	721	131	0	33	284	561	0	240	322	17	3,604

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

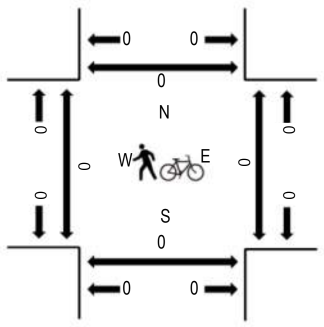
Location: #10 Clower St & City Hall Dr PM
Date and Start Time: Tuesday, October 1, 2019
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	City Hall Dr Eastbound				City Hall Dr Westbound				Clower St Northbound				Clower St Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	0	0	0	1	0	7	0	0	28	2	0	3	25	0	66	264	0	0	0	0
4:15 PM	0	0	2	0	0	4	1	5	0	1	22	4	0	7	16	0	62	264	0	0	0	0
4:30 PM	0	0	0	0	0	4	0	10	0	0	27	1	0	1	26	0	69	271	0	0	0	0
4:45 PM	0	0	0	0	0	3	0	7	0	0	28	2	0	3	24	0	67	267	0	0	0	0
5:00 PM	0	0	0	0	0	1	0	10	0	0	23	1	0	1	30	0	66	249	0	0	0	0
5:15 PM	0	0	0	0	0	1	0	7	0	0	31	4	0	3	22	1	69		0	0	0	0
5:30 PM	0	0	1	0	0	2	0	4	0	0	24	2	0	4	28	0	65		0	0	0	0
5:45 PM	0	1	1	0	0	1	0	1	0	1	23	2	0	1	18	0	49		0	0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	0	0	0	9	0	34	0	0	109	8	0	8	102	1	271
Mediums	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	9	0	34	0	0	109	8	0	8	102	1	271

All Traffic Data Services, Inc

alltrafficdata.net

Site Code: 1
Station ID: 1
WISTERIA DRIVE WEST OF CLOWER STREET

Start	01-Oct-19	EB		Hour Totals		WB		Hour Totals		Combined Totals	
Time	Tue	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		21	131			14	143				
12:15		15	150			11	147				
12:30		16	155			10	172				
12:45		16	138	68	574	8	158	43	620	111	1194
01:00		14	168			9	129				
01:15		7	136			9	169				
01:30		4	162			5	158				
01:45		6	123	31	589	9	137	32	593	63	1182
02:00		2	184			5	132				
02:15		5	186			6	139				
02:30		7	171			7	148				
02:45		4	179	18	720	10	116	28	535	46	1255
03:00		3	158			11	150				
03:15		2	163			7	143				
03:30		7	163			11	154				
03:45		9	196	21	680	13	132	42	579	63	1259
04:00		5	184			13	132				
04:15		8	169			23	112				
04:30		9	221			29	144				
04:45		6	209	28	783	45	165	110	553	138	1336
05:00		14	209			71	141				
05:15		18	194			96	139				
05:30		14	167			110	146				
05:45		25	192	71	762	134	138	411	564	482	1326
06:00		33	195			170	160				
06:15		45	206			144	144				
06:30		70	179			190	138				
06:45		65	158	213	738	179	135	683	577	896	1315
07:00		60	170			234	106				
07:15		80	158			210	107				
07:30		72	149			203	102				
07:45		103	152	315	629	200	109	847	424	1162	1053
08:00		84	145			189	96				
08:15		79	157			156	68				
08:30		83	140			162	82				
08:45		96	119	342	561	149	57	656	303	998	864
09:00		100	94			163	63				
09:15		93	98			172	43				
09:30		110	83			180	51				
09:45		111	82	414	357	176	41	691	198	1105	555
10:00		99	64			144	39				
10:15		105	56			145	36				
10:30		116	56			163	28				
10:45		96	44	416	220	150	14	602	117	1018	337
11:00		112	37			152	20				
11:15		115	35			170	25				
11:30		133	35			158	20				
11:45		142	21	502	128	160	12	640	77	1142	205
Total		2439	6741			4785	5140			7224	11881
Percent		26.6%	73.4%			48.2%	51.8%			37.8%	62.2%
Grand Total		2439	6741			4785	5140			7224	11881
Percent		26.6%	73.4%			48.2%	51.8%			37.8%	62.2%
ADT		ADT 19,105		AADT 19,105							

All Traffic Data Services, Inc

alltrafficdata.net

Site Code: 2
Station ID: 2
OAK ROAD WEST OF CLOWER STREET

Start	01-Oct-19	EB		Hour Totals		WB		Hour Totals		Combined Totals	
Time	Tue	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		3	85			4	107				
12:15		9	130			6	88				
12:30		4	133			6	127				
12:45		5	109	21	457	0	103	16	425	37	882
01:00		0	118			3	83				
01:15		5	119			1	118				
01:30		2	111			2	115				
01:45		4	119	11	467	2	85	8	401	19	868
02:00		3	123			1	91				
02:15		1	110			1	86				
02:30		5	100			2	104				
02:45		0	104	9	437	2	105	6	386	15	823
03:00		2	98			0	116				
03:15		2	91			2	110				
03:30		1	106			3	110				
03:45		2	107	7	402	4	83	9	419	16	821
04:00		6	128			2	92				
04:15		5	122			5	109				
04:30		1	137			5	93				
04:45		3	137	15	524	4	82	16	376	31	900
05:00		10	132			6	94				
05:15		14	149			28	113				
05:30		13	131			37	121				
05:45		13	137	50	549	64	108	135	436	185	985
06:00		26	132			77	83				
06:15		27	127			112	101				
06:30		31	112			93	82				
06:45		36	99	120	470	114	79	396	345	516	815
07:00		38	84			97	84				
07:15		36	98			122	59				
07:30		43	73			120	76				
07:45		49	91	166	346	100	55	439	274	605	620
08:00		45	84			116	46				
08:15		58	72			103	35				
08:30		56	75			102	34				
08:45		77	48	236	279	107	33	428	148	664	427
09:00		88	55			110	34				
09:15		95	42			112	29				
09:30		70	42			100	27				
09:45		78	31	331	170	92	22	414	112	745	282
10:00		75	22			95	16				
10:15		82	21			100	19				
10:30		68	25			96	18				
10:45		66	14	291	82	95	13	386	66	677	148
11:00		79	6			75	13				
11:15		70	11			91	6				
11:30		92	11			90	3				
11:45		79	4	320	32	117	4	373	26	693	58
Total		1577	4215			2626	3414			4203	7629
Percent		27.2%	72.8%			43.5%	56.5%			35.5%	64.5%
Grand Total		1577	4215			2626	3414			4203	7629
Percent		27.2%	72.8%			43.5%	56.5%			35.5%	64.5%
ADT		ADT 11,832		AADT 11,832							

All Traffic Data Services, Inc

alltrafficdata.net

Site Code: 3
Station ID: 3
NORTH ROAD SOUTH OF WISTERIA DRIVE

Start Time	01-Oct-1 Tue	SB								
12:00 AM		7								
01:00		9								
02:00		0								
03:00		4								
04:00		17								
05:00		41								
06:00		114								
07:00		144								
08:00		182								
09:00		**193**								
10:00		167								
11:00		154								
12:00 PM		200								
01:00		193								
02:00		206								
03:00		216								
04:00		**253**								
05:00		228								
06:00		225								
07:00		141								
08:00		100								
09:00		53								
10:00		41								
11:00		23								
Total		2911								
AM Peak	-	09:00	-	-	-	-	-	-	-	-
Vol.	-	193	-	-	-	-	-	-	-	-
PM Peak	-	16:00	-	-	-	-	-	-	-	-
Vol.	-	253	-	-	-	-	-	-	-	-
Grand Total		2911								
ADT		ADT 2,911	AADT 2,911							

All Traffic Data Services, Inc

alltrafficdata.net

Site Code: 4
Station ID: 4
CLOWER STREET SOUTH OF WISTERIA DRIVE

Start	01-Oct-19	NB		Hour Totals		SB		Hour Totals		Combined Totals	
Time	Tue	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		0	24			0	33				
12:15		0	29			0	24				
12:30		0	33			1	33				
12:45		1	22	1	108	0	31	1	121	2	229
01:00		1	28			0	32				
01:15		1	39			0	33				
01:30		0	39			0	34				
01:45		1	31	3	137	0	30	0	129	3	266
02:00		1	24			0	27				
02:15		0	35			0	29				
02:30		0	32			0	43				
02:45		0	24	1	115	0	32	0	131	1	246
03:00		1	25			0	26				
03:15		0	29			0	32				
03:30		0	36			0	18				
03:45		0	32	1	122	0	38	0	114	1	236
04:00		0	36			0	29				
04:15		1	28			1	22				
04:30		1	37			0	26				
04:45		1	33	3	134	0	26	1	103	4	237
05:00		4	33			1	31				
05:15		8	37			3	27				
05:30		4	28			4	33				
05:45		7	25	23	123	8	17	16	108	39	231
06:00		7	33			18	25				
06:15		9	19			18	30				
06:30		25	19			16	12				
06:45		24	35	65	106	9	12	61	79	126	185
07:00		24	20			9	26				
07:15		28	19			15	9				
07:30		21	22			27	16				
07:45		20	24	93	85	24	13	75	64	168	149
08:00		18	16			17	12				
08:15		21	9			19	7				
08:30		25	11			28	13				
08:45		30	7	94	43	28	5	92	37	186	80
09:00		31	12			29	8				
09:15		25	1			28	4				
09:30		27	4			36	5				
09:45		19	5	102	22	18	3	111	20	213	42
10:00		21	4			22	1				
10:15		19	1			21	0				
10:30		22	3			24	3				
10:45		18	1	80	9	13	1	80	5	160	14
11:00		32	1			29	1				
11:15		17	1			26	0				
11:30		24	1			33	0				
11:45		23	1	96	4	34	1	122	2	218	6
Total		562	1008			559	913			1121	1921
Percent		35.8%	64.2%			38.0%	62.0%			36.9%	63.1%
Grand Total		562	1008			559	913			1121	1921
Percent		35.8%	64.2%			38.0%	62.0%			36.9%	63.1%
ADT		ADT 3,042		AADT 3,042							

APPENDIX B :

PARCEL LOCATIONS\LAND USES

Master Conceptual Plan

Key

1. Parking Garage
2. Multi-Family Residential

4a. Library/ Office/ Community Space

4b. 2 Story Market

6. Town Green

7a. Commercial

7b. Commercial

9. Commercial

10. Commercial

11. Future Development

12. Future Development

0' 75' 150' 300'

MIDCITY
REAL ESTATE PARTNERS

CASTO

SMALLWOOD

The Grove at Towne Center

The Grove at Towne Center

Development Plan

9/10/19

Phase 1

Parcel 1	Residential - One Bedroom - 125 Units
	Residential - Two Bedroom - 130 Units
	Residential - Three Bedroom - 20 Units
Parcel 4A	Library 22,500 sf plus 2nd floor of 22,500 sf = 45,000 sf total
Parcel 4B	Market 17,000 sf plus 2nd floor of 17,000 sf = 34,000 sf total
Parcel 7A&B	Restaurant - 8,200 sf
Parcel 9	Commercial - 16,000 sf
Parcel 10	Commercial – 15,000 sf

Phase 2

Parcel 11	Residential - One Bedroom – 57 Units
	Residential - Two Bedroom - 57 Units
	Commercial - 36,000 sf
Parcel 12	Residential - Two Bedroom - 20 Units
	Residential - Three Bedroom - 20 Units
	Commercial - 10,000 sf

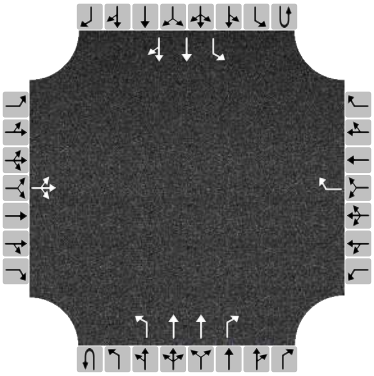
APPENDIX C :

CAPACITY ANALYSIS REPORTS

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	SR 124 @ Wisteria
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Wisteria Dr
Analysis Year	2019	North/South Street	SR 124
Time Analyzed	Existing AM	Peak Hour Factor	0.96
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	1	2	1	0	1	2	0
Configuration			LTR					R		L	T	R		L	T	TR
Volume, V (veh/h)		0	0	10				260		2	1901	89		152	1429	0
Percent Heavy Vehicles (%)		3	3	3				3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				Yes				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

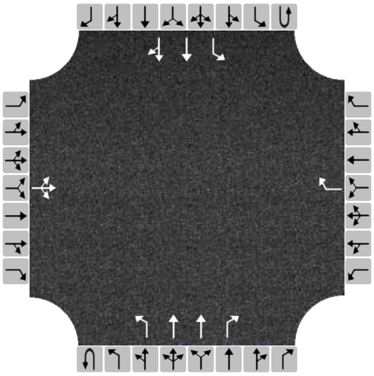
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			10					271		2				158		
Capacity, c (veh/h)			355					244		442				284		
v/c Ratio			0.03					1.11		0.00				0.56		
95% Queue Length, Q_{95} (veh)			0.1					11.9		0.0				3.1		
Control Delay (s/veh)			15.4					134.9		13.2				32.4		
Level of Service, LOS			C					F		B				D		
Approach Delay (s/veh)	15.4				134.9				0.0				3.1			
Approach LOS	C				F											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	SR 124 @ Wisteria
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Wisteria Dr
Analysis Year	2019	North/South Street	SR 124
Time Analyzed	Existing PM	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	1	2	1	0	1	2	0
Configuration			LTR					R		L	T	R		L	T	TR
Volume, V (veh/h)		0	0	3				229		3	1655	204		310	1635	3
Percent Heavy Vehicles (%)		3	3	3				3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				Yes				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

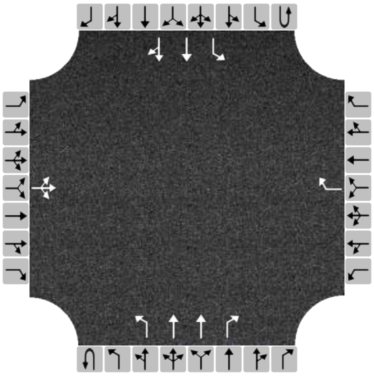
Flow Rate, v (veh/h)			3					234		3				316		
Capacity, c (veh/h)			308					305		376				370		
v/c Ratio			0.01					0.77		0.01				0.85		
95% Queue Length, Q_{95} (veh)			0.0					5.9		0.0				8.0		
Control Delay (s/veh)			16.8					47.1		14.7				51.4		
Level of Service, LOS			C					E		B				F		
Approach Delay (s/veh)	16.8				47.1				0.0				8.2			
Approach LOS	C				E											

HCS7 Two-Way Stop-Control Report

General Information / Site Information

General Information		Site Information	
Analyst	MS	Intersection	SR 124 @ Wisteria
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	SR 124
Time Analyzed	Background AM	Peak Hour Factor	0.96
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	1	2	1	0	1	2	0
Configuration			LTR					R		L	T	R		L	T	TR
Volume, V (veh/h)		0	0	11				281		2	2058	96		165	1547	0
Percent Heavy Vehicles (%)		3	3	3				3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				Yes				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		7.5	6.5	6.9				6.9		4.1				4.1		
Critical Headway (sec)		7.56	6.56	6.96				6.96		4.16				4.16		
Base Follow-Up Headway (sec)		3.5	4.0	3.3				3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33				3.33		2.23				2.23		

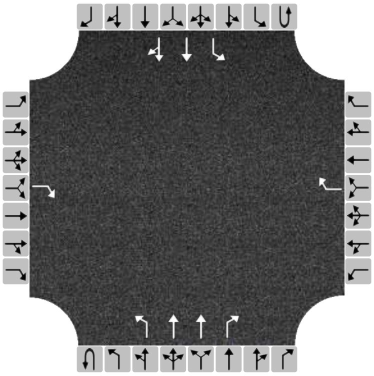
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11					293		2				172		
Capacity, c (veh/h)			323					215		397				245		
v/c Ratio			0.03					1.37		0.01				0.70		
95% Queue Length, Q_{95} (veh)			0.1					16.5		0.0				4.7		
Control Delay (s/veh)			16.5					234.7		14.1				48.3		
Level of Service, LOS			C					F		B				E		
Approach Delay (s/veh)	16.5				234.7				0.0				4.7			
Approach LOS	C				F											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	SR 124 @ Wisteria
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	SR 124
Time Analyzed	Background PM	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	1	0	1	2	1	0	1	2	0
Configuration				R				R		L	T	R		L	T	TR
Volume, V (veh/h)				3				248		3	1791	221		336	1770	3
Percent Heavy Vehicles (%)				3				3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				Yes				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

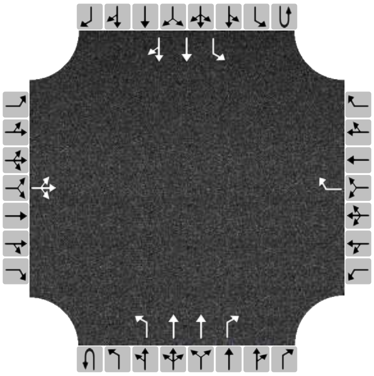
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				3				253		3				343		
Capacity, c (veh/h)				278				274		332				326		
v/c Ratio				0.01				0.92		0.01				1.05		
95% Queue Length, Q_{95} (veh)				0.0				8.5		0.0				12.4		
Control Delay (s/veh)				18.1				77.0		15.9				100.7		
Level of Service, LOS				C				F		C				F		
Approach Delay (s/veh)	18.1				77.0				0.0				16.0			
Approach LOS	C				F											

HCS7 Two-Way Stop-Control Report

General Information		**Site Information**	
Analyst	MS	Intersection	SR 124 @ Wisteria
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	SR 124
Time Analyzed	Project AM	Peak Hour Factor	0.96
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	1	0	1	2	1	0	1	2	0
Configuration			LTR					R		L	T	R		L	T	TR
Volume, V (veh/h)		0	0	11				288		2	2068	102		174	1551	0
Percent Heavy Vehicles (%)		3	3	3				3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				Yes				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

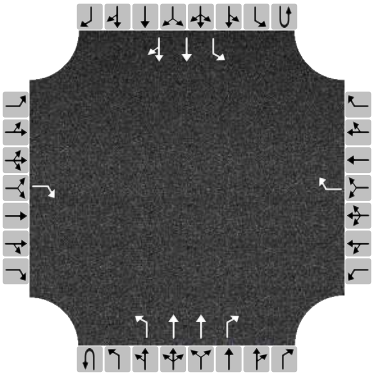
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			11					300		2				181		
Capacity, c (veh/h)			322					213		395				243		
v/c Ratio			0.03					1.41		0.01				0.75		
95% Queue Length, Q_{95} (veh)			0.1					17.4		0.0				5.2		
Control Delay (s/veh)			16.6					252.5		14.2				53.4		
Level of Service, LOS			C					F		B				F		
Approach Delay (s/veh)	16.6				252.5				0.0				5.4			
Approach LOS	C				F											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	SR 124 @ Wisteria
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	SR 124
Time Analyzed	Project PM	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	1		0	0	1	0	1	2	1	0	1	2	0
Configuration				R				R		L	T	R		L	T	TR
Volume, V (veh/h)				3				264		3	1817	240		366	1785	3
Percent Heavy Vehicles (%)				3				3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				Yes				Yes				No			
Median Type/Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)				3				269		3				373		
Capacity, c (veh/h)				275				268		328				319		
v/c Ratio				0.01				1.00		0.01				1.17		
95% Queue Length, Q_{95} (veh)				0.0				10.1		0.0				15.7		
Control Delay (s/veh)				18.3				96.8		16.1				140.7		
Level of Service, LOS				C				F		C				F		
Approach Delay (s/veh)	18.3				96.8				0.0				23.9			
Approach LOS	C				F											

Queues
2: North Rd & Wisteria Dr

	↗	→	↙	←	↓
Lane Group	EBL	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	47	182	22	866	283
v/c Ratio	0.17	0.16	0.04	0.94	0.67
Control Delay	7.2	6.5	12.2	35.1	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	6.5	12.2	35.1	30.8
Queue Length 50th (ft)	7	27	5	~302	105
Queue Length 95th (ft)	20	61	18	#608	182
Internal Link Dist (ft)		223		562	481
Turn Bay Length (ft)	115		130		
Base Capacity (vph)	382	1384	599	925	599
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	0.12	0.13	0.04	0.94	0.47

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱						✥	
Traffic Volume (veh/h)	46	177	0	21	257	583	0	0	0	141	133	1
Future Volume (veh/h)	46	177	0	21	257	583	0	0	0	141	133	1
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900				1900	1863	1900
Adj Flow Rate, veh/h	47	182	0	22	265	601				145	137	1
Adj No. of Lanes	1	1	1	1	1	0				0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2				0	2	0
Cap, veh/h	187	1176	1000	733	259	587				185	174	1
Arrive On Green	0.04	0.63	0.00	0.51	0.51	0.51				0.20	0.20	0.20
Sat Flow, veh/h	1774	1863	1583	1197	508	1152				930	879	6
Grp Volume(v), veh/h	47	182	0	22	0	866				283	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1197	0	1660				1815	0	0
Q Serve(g_s), s	0.7	2.3	0.0	0.5	0.0	30.0				8.7	0.0	0.0
Cycle Q Clear(g_c), s	0.7	2.3	0.0	0.5	0.0	30.0				8.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.69				0.51		0.00
Lane Grp Cap(c), veh/h	187	1176	1000	733	0	846				360	0	0
V/C Ratio(X)	0.25	0.15	0.00	0.03	0.00	1.02				0.79	0.00	0.00
Avail Cap(c_a), veh/h	424	1425	1211	733	0	846				617	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	14.0	4.4	0.0	7.2	0.0	14.4				22.4	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.1	0.0	0.0	0.0	36.9				3.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.2	0.0	0.2	0.0	22.1				4.7	0.0	0.0
LnGrp Delay(d),s/veh	14.7	4.5	0.0	7.2	0.0	51.3				26.2	0.0	0.0
LnGrp LOS	B	A		A		F				C		
Approach Vol, veh/h		229			888						283	
Approach Delay, s/veh		6.6			50.2						26.2	
Approach LOS		A			D						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	7.1	35.0		16.7		42.1		
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		
Max Green Setting (Gmax), s	* 10	* 30		* 20		* 45		
Max Q Clear Time (g_c+I1), s	2.7	32.0		10.7		4.3		
Green Ext Time (p_c), s	0.0	0.0		1.1		10.4		

Intersection Summary	
HCM 2010 Ctrl Delay	38.2
HCM 2010 LOS	D

Notes

2: North Rd & Wisteria Dr

Lane Group	EBL	EBT	EBR	WBL	WBT	SBT
Lane Group Flow (vph)	104	426	7	26	660	629
v/c Ratio	0.40	0.45	0.01	0.07	0.95	0.94
Control Delay	15.0	14.6	0.6	18.8	46.7	50.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	14.6	0.6	18.8	46.7	50.0
Queue Length 50th (ft)	26	130	0	9	289	315
Queue Length 95th (ft)	51	200	1	27	#538	#550
Internal Link Dist (ft)		223			562	481
Turn Bay Length (ft)	115			130		
Base Capacity (vph)	300	1045	899	357	698	674
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	0.35	0.41	0.01	0.07	0.95	0.93

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱						✥	
Traffic Volume (veh/h)	100	409	7	25	242	392	0	0	0	392	209	3
Future Volume (veh/h)	100	409	7	25	242	392	0	0	0	392	209	3
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900				1900	1863	1900
Adj Flow Rate, veh/h	104	426	7	26	252	408				408	218	3
Adj No. of Lanes	1	1	1	1	1	0				0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2				0	2	0
Cap, veh/h	188	933	793	428	246	398				434	232	3
Arrive On Green	0.05	0.50	0.50	0.38	0.38	0.38				0.37	0.37	0.37
Sat Flow, veh/h	1774	1863	1583	951	641	1038				1169	625	9
Grp Volume(v), veh/h	104	426	7	26	0	660				629	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	951	0	1680				1803	0	0
Q Serve(g_s), s	2.6	11.6	0.2	1.4	0.0	30.0				26.4	0.0	0.0
Cycle Q Clear(g_c), s	2.6	11.6	0.2	3.8	0.0	30.0				26.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.62				0.65		0.00
Lane Grp Cap(c), veh/h	188	933	793	428	0	643				670	0	0
V/C Ratio(X)	0.55	0.46	0.01	0.06	0.00	1.03				0.94	0.00	0.00
Avail Cap(c_a), veh/h	319	1070	910	428	0	643				691	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	18.5	12.6	9.8	16.9	0.0	24.2				23.8	0.0	0.0
Incr Delay (d2), s/veh	2.5	0.3	0.0	0.1	0.0	42.2				20.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	6.0	0.1	0.4	0.0	21.3				16.9	0.0	0.0
LnGrp Delay(d),s/veh	21.1	13.0	9.8	16.9	0.0	66.3				44.2	0.0	0.0
LnGrp LOS	C	B	A	B		F				D		
Approach Vol, veh/h		537			686						629	
Approach Delay, s/veh		14.5			64.5						44.2	
Approach LOS		B			E						D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	9.2	35.0		34.1		44.2		
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		
Max Green Setting (Gmax), s	* 10	* 30		* 30		* 45		
Max Q Clear Time (g_c+I1), s	4.6	32.0		28.4		13.6		
Green Ext Time (p_c), s	0.1	0.0		0.7		9.0		

Intersection Summary	
HCM 2010 Ctrl Delay	43.1
HCM 2010 LOS	D

Notes

Queues
2: North Rd & Wisteria Dr

Lane Group	EBL	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	52	198	24	938	307
v/c Ratio	0.18	0.18	0.04	1.03	0.70
Control Delay	7.5	6.8	12.5	56.1	31.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	6.8	12.5	56.1	31.8
Queue Length 50th (ft)	8	31	5	~414	116
Queue Length 95th (ft)	22	66	20	#687	199
Internal Link Dist (ft)		223		562	481
Turn Bay Length (ft)	115		130		
Base Capacity (vph)	380	1376	580	913	596
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	0.14	0.14	0.04	1.03	0.52

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱						✥	
Traffic Volume (veh/h)	50	192	0	23	278	631	0	0	0	153	144	1
Future Volume (veh/h)	50	192	0	23	278	631	0	0	0	153	144	1
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900				1900	1863	1900
Adj Flow Rate, veh/h	52	198	0	24	287	651				158	148	1
Adj No. of Lanes	1	1	1	1	1	0				0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97				0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2				0	2	0
Cap, veh/h	189	1159	985	710	254	576				197	185	1
Arrive On Green	0.04	0.62	0.00	0.50	0.50	0.50				0.21	0.21	0.21
Sat Flow, veh/h	1774	1863	1583	1180	508	1152				934	875	6
Grp Volume(v), veh/h	52	198	0	24	0	938				307	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1180	0	1659				1815	0	0
Q Serve(g_s), s	0.8	2.7	0.0	0.6	0.0	30.0				9.6	0.0	0.0
Cycle Q Clear(g_c), s	0.8	2.7	0.0	0.6	0.0	30.0				9.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.69				0.51		0.00
Lane Grp Cap(c), veh/h	189	1159	985	710	0	830				384	0	0
V/C Ratio(X)	0.28	0.17	0.00	0.03	0.00	1.13				0.80	0.00	0.00
Avail Cap(c_a), veh/h	416	1397	1188	710	0	830				605	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	14.2	4.8	0.0	7.7	0.0	15.0				22.5	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.1	0.0	0.0	0.0	73.7				4.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.4	0.0	0.2	0.0	30.6				5.2	0.0	0.0
LnGrp Delay(d),s/veh	15.0	4.9	0.0	7.7	0.0	88.7				26.6	0.0	0.0
LnGrp LOS	B	A		A		F				C		
Approach Vol, veh/h		250			962						307	
Approach Delay, s/veh		7.0			86.6						26.6	
Approach LOS		A			F						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	7.3	35.0		17.7		42.3		
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		
Max Green Setting (Gmax), s	* 10	* 30		* 20		* 45		
Max Q Clear Time (g_c+I1), s	2.8	32.0		11.6		4.7		
Green Ext Time (p_c), s	0.0	0.0		1.1		12.0		

Intersection Summary	
HCM 2010 Ctrl Delay	61.4
HCM 2010 LOS	E

Notes

2: North Rd & Wisteria Dr

	↗	→	↘	↙	←	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	SBT
Lane Group Flow (vph)	113	461	8	28	715	680
v/c Ratio	0.43	0.49	0.01	0.08	1.03	1.01
Control Delay	15.6	15.2	1.0	19.0	66.1	66.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	15.2	1.0	19.0	66.1	66.7
Queue Length 50th (ft)	29	145	0	9	~376	~391
Queue Length 95th (ft)	55	221	2	29	#606	#613
Internal Link Dist (ft)		223			562	481
Turn Bay Length (ft)	115			130		
Base Capacity (vph)	300	1041	896	345	696	672
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	0.38	0.44	0.01	0.08	1.03	1.01

Intersection Summary

~ 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.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱						✥	
Traffic Volume (veh/h)	108	443	8	27	262	424	0	0	0	424	226	3
Future Volume (veh/h)	108	443	8	27	262	424	0	0	0	424	226	3
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900				1900	1863	1900
Adj Flow Rate, veh/h	112	461	8	28	273	442				442	235	3
Adj No. of Lanes	1	1	1	1	1	0				0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96				0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2				0	2	0
Cap, veh/h	193	926	787	396	242	391				442	235	3
Arrive On Green	0.06	0.50	0.50	0.38	0.38	0.38				0.38	0.38	0.38
Sat Flow, veh/h	1774	1863	1583	920	641	1038				1172	623	8
Grp Volume(v), veh/h	112	461	8	28	0	715				680	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	920	0	1680				1803	0	0
Q Serve(g_s), s	2.9	13.2	0.2	1.7	0.0	30.0				30.0	0.0	0.0
Cycle Q Clear(g_c), s	2.9	13.2	0.2	5.2	0.0	30.0				30.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.62				0.65		0.00
Lane Grp Cap(c), veh/h	193	926	787	396	0	633				680	0	0
V/C Ratio(X)	0.58	0.50	0.01	0.07	0.00	1.13				1.00	0.00	0.00
Avail Cap(c_a), veh/h	313	1053	895	396	0	633				680	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00				1.00	0.00	0.00
Uniform Delay (d), s/veh	18.8	13.4	10.1	18.3	0.0	24.8				24.8	0.0	0.0
Incr Delay (d2), s/veh	2.8	0.4	0.0	0.1	0.0	76.9				34.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	6.8	0.1	0.4	0.0	27.3				21.3	0.0	0.0
LnGrp Delay(d),s/veh	21.6	13.8	10.1	18.4	0.0	101.7				59.4	0.0	0.0
LnGrp LOS	C	B	B	B		F				F		
Approach Vol, veh/h		581			743						680	
Approach Delay, s/veh		15.2			98.6						59.4	
Approach LOS		B			F						E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	9.6	35.0		35.0		44.6		
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		
Max Green Setting (Gmax), s	* 10	* 30		* 30		* 45		
Max Q Clear Time (g_c+I1), s	4.9	32.0		32.0		15.2		
Green Ext Time (p_c), s	0.1	0.0		0.0		10.0		

Intersection Summary	
HCM 2010 Ctrl Delay	61.1
HCM 2010 LOS	E

Notes

2: North Rd & Wisteria Dr

	↗	→	↘	←	↑	↓
Lane Group	EBL	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	52	207	6	978	6	316
v/c Ratio	0.16	0.19	0.01	1.11	0.01	0.77
Control Delay	7.5	7.4	0.0	83.6	19.2	37.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	7.4	0.0	83.6	19.2	37.4
Queue Length 50th (ft)	9	39	0	~500	2	125
Queue Length 95th (ft)	22	69	0	#737	10	#244
Internal Link Dist (ft)		223		562	489	481
Turn Bay Length (ft)	115					
Base Capacity (vph)	417	1335	1142	884	538	495
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	0.16	0.01	1.11	0.01	0.64

Intersection Summary

~ 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.

HCM 2010 Signalized Intersection Summary
2: North Rd & Wisteria Dr

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱		✥			✥			✥	
Traffic Volume (veh/h)	50	201	6	28	282	638	2	4	0	158	147	1
Future Volume (veh/h)	50	201	6	28	282	638	2	4	0	158	147	1
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	52	207	6	29	291	658	2	4	0	163	152	1
Adj No. of Lanes	1	1	1	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	306	1126	957	72	251	539	169	296	0	270	193	1
Arrive On Green	0.04	0.60	0.60	0.49	0.49	0.49	0.23	0.23	0.00	0.23	0.23	0.23
Sat Flow, veh/h	1774	1863	1583	24	517	1112	390	1267	0	778	827	5
Grp Volume(v), veh/h	52	207	6	978	0	0	6	0	0	316	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1652	0	0	1657	0	0	1610	0	0
Q Serve(g_s), s	0.8	3.1	0.1	14.8	0.0	0.0	0.0	0.0	0.0	10.7	0.0	0.0
Cycle Q Clear(g_c), s	0.8	3.1	0.1	30.0	0.0	0.0	0.2	0.0	0.0	11.5	0.0	0.0
Prop In Lane	1.00		1.00	0.03		0.67	0.33		0.00	0.52		0.00
Lane Grp Cap(c), veh/h	306	1126	957	862	0	0	465	0	0	465	0	0
V/C Ratio(X)	0.17	0.18	0.01	1.13	0.00	0.00	0.01	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	525	1356	1153	862	0	0	608	0	0	608	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.3	5.4	4.9	16.9	0.0	0.0	18.2	0.0	0.0	22.5	0.0	0.0
Incr Delay (d2), s/veh	0.3	0.1	0.0	74.9	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.6	0.0	32.3	0.0	0.0	0.1	0.0	0.0	5.4	0.0	0.0
LnGrp Delay(d),s/veh	6.5	5.5	4.9	91.8	0.0	0.0	18.2	0.0	0.0	24.5	0.0	0.0
LnGrp LOS	A	A	A	F			B			C		
Approach Vol, veh/h		265			978			6			316	
Approach Delay, s/veh		5.7			91.8			18.2			24.5	
Approach LOS		A			F			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	7.4	35.0		19.5		42.4		19.5
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		* 5
Max Green Setting (Gmax), s	* 10	* 30		* 20		* 45		* 20
Max Q Clear Time (g_c+I1), s	2.8	32.0		13.5		5.1		2.2
Green Ext Time (p_c), s	0.0	0.0		1.0		12.9		1.8

Intersection Summary			
HCM 2010 Ctrl Delay			63.4
HCM 2010 LOS			E

Notes

2: North Rd & Wisteria Dr

	↗	→	↘	↙	←	↑	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	52	207	6	29	949	6	316
v/c Ratio	0.19	0.19	0.01	0.05	1.07	0.01	0.77
Control Delay	8.0	7.4	0.0	12.9	68.6	19.2	37.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	7.4	0.0	12.9	68.6	19.2	37.4
Queue Length 50th (ft)	9	39	0	7	~463	2	125
Queue Length 95th (ft)	22	69	0	22	#698	10	#244
Internal Link Dist (ft)		223			562	489	481
Turn Bay Length (ft)	115			130			
Base Capacity (vph)	369	1335	1142	558	891	538	495
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.16	0.01	0.05	1.07	0.01	0.64

Intersection Summary

~ 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱			✥			✥	
Traffic Volume (veh/h)	50	201	6	28	282	638	2	4	0	158	147	1
Future Volume (veh/h)	50	201	6	28	282	638	2	4	0	158	147	1
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	52	207	6	29	291	658	2	4	0	163	152	1
Adj No. of Lanes	1	1	1	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	184	1126	957	681	247	558	169	296	0	270	193	1
Arrive On Green	0.04	0.60	0.60	0.49	0.49	0.49	0.23	0.23	0.00	0.23	0.23	0.23
Sat Flow, veh/h	1774	1863	1583	1164	509	1151	390	1267	0	778	827	5
Grp Volume(v), veh/h	52	207	6	29	0	949	6	0	0	316	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1164	0	1660	1657	0	0	1610	0	0
Q Serve(g_s), s	0.8	3.1	0.1	0.8	0.0	30.0	0.0	0.0	0.0	10.7	0.0	0.0
Cycle Q Clear(g_c), s	0.8	3.1	0.1	0.8	0.0	30.0	0.2	0.0	0.0	11.5	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.69	0.33		0.00	0.52		0.00
Lane Grp Cap(c), veh/h	184	1126	957	681	0	805	465	0	0	465	0	0
V/C Ratio(X)	0.28	0.18	0.01	0.04	0.00	1.18	0.01	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	403	1356	1153	681	0	805	608	0	0	608	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.6	5.4	4.9	8.4	0.0	15.9	18.2	0.0	0.0	22.5	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.1	0.0	0.0	0.0	93.0	0.0	0.0	0.0	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.6	0.0	0.3	0.0	34.2	0.1	0.0	0.0	5.4	0.0	0.0
LnGrp Delay(d),s/veh	15.4	5.5	4.9	8.4	0.0	108.9	18.2	0.0	0.0	24.5	0.0	0.0
LnGrp LOS	B	A	A	A		F	B			C		
Approach Vol, veh/h		265			978			6			316	
Approach Delay, s/veh		7.4			105.9			18.2			24.5	
Approach LOS		A			F			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	7.4	35.0		19.5		42.4		19.5
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		* 5
Max Green Setting (Gmax), s	* 10	* 30		* 20		* 45		* 20
Max Q Clear Time (g_c+I1), s	2.8	32.0		13.5		5.1		2.2
Green Ext Time (p_c), s	0.0	0.0		1.0		12.4		1.8

Intersection Summary			
HCM 2010 Ctrl Delay			72.5
HCM 2010 LOS			E

Notes

Queues

2: North Rd & Wisteria Dr

	↗	→	↘	←	↑	↓
Lane Group	EBL	EBT	EBR	WBT	NBT	SBT
Lane Group Flow (vph)	113	493	27	785	15	710
v/c Ratio	0.38	0.53	0.03	1.18	0.03	1.29
Control Delay	14.1	15.7	4.0	119.0	18.0	169.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	15.7	4.0	119.0	18.0	169.9
Queue Length 50th (ft)	29	158	0	~476	5	~488
Queue Length 95th (ft)	55	241	12	#715	18	#715
Internal Link Dist (ft)		223		562	489	481
Turn Bay Length (ft)	115					
Base Capacity (vph)	332	1041	896	668	599	551
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	0.34	0.47	0.03	1.18	0.03	1.29

Intersection Summary

~ 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.

2: North Rd & Wisteria Dr

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱		✣			✣			✣	
Traffic Volume (veh/h)	108	473	26	39	273	442	6	9	0	443	236	3
Future Volume (veh/h)	108	473	26	39	273	442	6	9	0	443	236	3
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	112	493	27	41	284	460	6	9	0	461	246	3
Adj No. of Lanes	1	1	1	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	926	787	67	236	361	271	382	0	451	201	2
Arrive On Green	0.06	0.50	0.50	0.38	0.38	0.38	0.38	0.38	0.00	0.38	0.38	0.38
Sat Flow, veh/h	1774	1863	1583	52	625	958	552	1014	0	998	532	6
Grp Volume(v), veh/h	112	493	27	785	0	0	15	0	0	710	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1635	0	0	1565	0	0	1537	0	0
Q Serve(g_s), s	2.9	14.4	0.7	18.6	0.0	0.0	0.0	0.0	0.0	29.6	0.0	0.0
Cycle Q Clear(g_c), s	2.9	14.4	0.7	30.0	0.0	0.0	0.4	0.0	0.0	30.0	0.0	0.0
Prop In Lane	1.00		1.00	0.05		0.59	0.40		0.00	0.65		0.00
Lane Grp Cap(c), veh/h	296	926	787	664	0	0	653	0	0	654	0	0
V/C Ratio(X)	0.38	0.53	0.03	1.18	0.00	0.00	0.02	0.00	0.00	1.09	0.00	0.00
Avail Cap(c_a), veh/h	417	1053	895	664	0	0	653	0	0	654	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	12.4	13.7	10.2	25.7	0.0	0.0	15.6	0.0	0.0	26.5	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.5	0.0	96.8	0.0	0.0	0.0	0.0	0.0	60.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	7.5	0.3	32.2	0.0	0.0	0.2	0.0	0.0	25.2	0.0	0.0
LnGrp Delay(d),s/veh	13.2	14.1	10.2	122.5	0.0	0.0	15.6	0.0	0.0	87.2	0.0	0.0
LnGrp LOS	B	B	B	F			B			F		
Approach Vol, veh/h		632			785			15			710	
Approach Delay, s/veh		13.8			122.5			15.6			87.2	
Approach LOS		B			F			B			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	9.6	35.0		35.0		44.6		35.0
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		* 5
Max Green Setting (Gmax), s	* 10	* 30		* 30		* 45		* 30
Max Q Clear Time (g_c+I1), s	4.9	32.0		32.0		16.4		2.4
Green Ext Time (p_c), s	0.1	0.0		0.0		11.2		5.7

Intersection Summary			
HCM 2010 Ctrl Delay			78.0
HCM 2010 LOS			E

Notes

2: North Rd & Wisteria Dr

	↗	→	↘	↙	←	↑	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	113	493	27	41	744	15	710
v/c Ratio	0.43	0.53	0.03	0.12	1.07	0.03	1.29
Control Delay	15.6	15.7	4.0	19.6	78.8	18.0	169.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	15.7	4.0	19.6	78.8	18.0	169.9
Queue Length 50th (ft)	29	158	0	14	~409	5	~488
Queue Length 95th (ft)	55	241	12	38	#642	18	#715
Internal Link Dist (ft)		223			562	489	481
Turn Bay Length (ft)	115			130			
Base Capacity (vph)	300	1041	896	335	696	599	551
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.47	0.03	0.12	1.07	0.03	1.29

Intersection Summary

~ 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.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱			✥			✥	
Traffic Volume (veh/h)	108	473	26	39	273	442	6	9	0	443	236	3
Future Volume (veh/h)	108	473	26	39	273	442	6	9	0	443	236	3
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	112	493	27	41	284	460	6	9	0	461	246	3
Adj No. of Lanes	1	1	1	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	926	787	368	242	391	271	382	0	451	201	2
Arrive On Green	0.06	0.50	0.50	0.38	0.38	0.38	0.38	0.38	0.00	0.38	0.38	0.38
Sat Flow, veh/h	1774	1863	1583	878	641	1038	552	1014	0	998	532	6
Grp Volume(v), veh/h	112	493	27	41	0	744	15	0	0	710	0	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	878	0	1679	1565	0	0	1537	0	0
Q Serve(g_s), s	2.9	14.4	0.7	2.7	0.0	30.0	0.0	0.0	0.0	29.6	0.0	0.0
Cycle Q Clear(g_c), s	2.9	14.4	0.7	7.5	0.0	30.0	0.4	0.0	0.0	30.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.62	0.40		0.00	0.65		0.00
Lane Grp Cap(c), veh/h	193	926	787	368	0	633	653	0	0	654	0	0
V/C Ratio(X)	0.58	0.53	0.03	0.11	0.00	1.18	0.02	0.00	0.00	1.09	0.00	0.00
Avail Cap(c_a), veh/h	313	1053	895	368	0	633	653	0	0	654	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.8	13.7	10.2	19.5	0.0	24.8	15.6	0.0	0.0	26.5	0.0	0.0
Incr Delay (d2), s/veh	2.8	0.5	0.0	0.1	0.0	94.7	0.0	0.0	0.0	60.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	7.5	0.3	0.7	0.0	30.4	0.2	0.0	0.0	25.2	0.0	0.0
LnGrp Delay(d),s/veh	21.6	14.1	10.2	19.6	0.0	119.4	15.6	0.0	0.0	87.2	0.0	0.0
LnGrp LOS	C	B	B	B		F	B			F		
Approach Vol, veh/h		632			785			15			710	
Approach Delay, s/veh		15.3			114.2			15.6			87.2	
Approach LOS		B			F			B			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	9.6	35.0		35.0		44.6		35.0
Change Period (Y+Rc), s	* 5	* 5		* 5		* 5		* 5
Max Green Setting (Gmax), s	* 10	* 30		* 30		* 45		* 30
Max Q Clear Time (g_c+I1), s	4.9	32.0		32.0		16.4		2.4
Green Ext Time (p_c), s	0.1	0.0		0.0		10.7		5.7

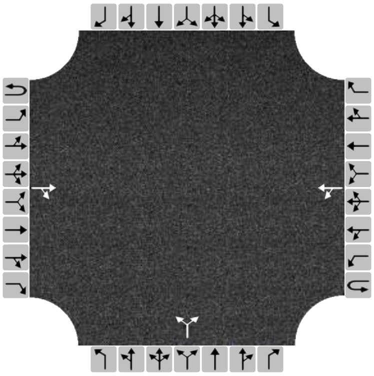
Intersection Summary	
HCM 2010 Ctrl Delay	75.4
HCM 2010 LOS	E

Notes

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria @ Parking Deck
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Parking Deck
Time Analyzed	Project AM	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			353	6		7	947			4		8				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

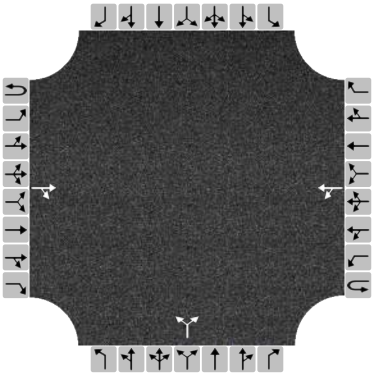
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						8					13					
Capacity, c (veh/h)						1161					317					
v/c Ratio						0.01					0.04					
95% Queue Length, Q_{95} (veh)						0.0					0.1					
Control Delay (s/veh)						8.1					16.9					
Level of Service, LOS						A					C					
Approach Delay (s/veh)					0.2				16.9							
Approach LOS									C							

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria @ Parking Deck
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Parking Deck
Time Analyzed	Project PM	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			895	21		23	691			10		21				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

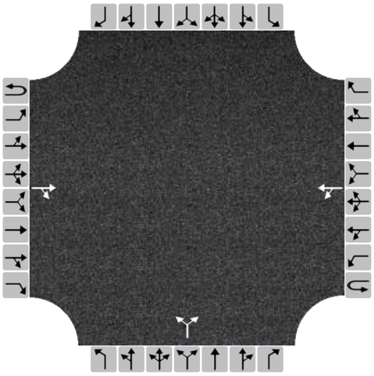
Flow Rate, v (veh/h)						25					34					
Capacity, c (veh/h)						690					166					
v/c Ratio						0.04					0.20					
95% Queue Length, Q_{95} (veh)						0.1					0.7					
Control Delay (s/veh)						10.4					32.2					
Level of Service, LOS						B					D					
Approach Delay (s/veh)					1.0				32.2							
Approach LOS									D							

HCS7 Two-Way Stop-Control Report

General Information | Site Information

Analyst	MS	Intersection	Wisteria @ Street B
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Street B
Time Analyzed	Project AM	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			375	2		2	952			2		3				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

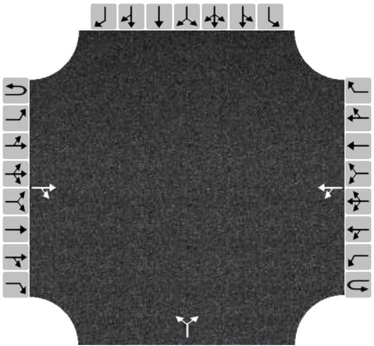
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						2					5					
Capacity, c (veh/h)						1142					269					
v/c Ratio						0.00					0.02					
95% Queue Length, Q_{95} (veh)						0.0					0.1					
Control Delay (s/veh)						8.2					18.7					
Level of Service, LOS						A					C					
Approach Delay (s/veh)					0.0				18.7							
Approach LOS									C							

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria @ Street B
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Street B
Time Analyzed	Project PM	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			950	8		6	709			5		8				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

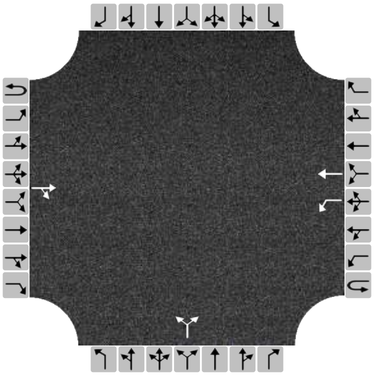
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						7					14					
Capacity, c (veh/h)						663					152					
v/c Ratio						0.01					0.09					
95% Queue Length, Q_{95} (veh)						0.0					0.3					
Control Delay (s/veh)						10.5					31.0					
Level of Service, LOS						B					D					
Approach Delay (s/veh)					0.3				31.0							
Approach LOS									D							

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Wisteria Dr
Analysis Year	2019	North/South Street	Clower St
Time Analyzed	Existing AM	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			298	23		53	781			83		10				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

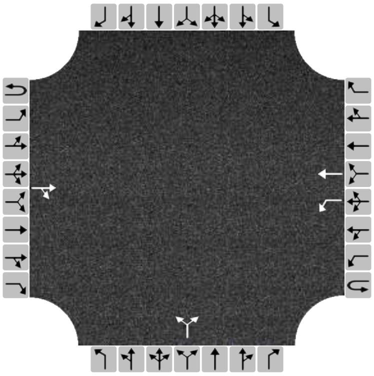
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						56					98					
Capacity, c (veh/h)						1214					195					
v/c Ratio						0.05					0.50					
95% Queue Length, Q_{95} (veh)						0.1					2.5					
Control Delay (s/veh)						8.1					40.8					
Level of Service, LOS						A					E					
Approach Delay (s/veh)					0.5				40.8							
Approach LOS									E							

HCS7 Two-Way Stop-Control Report

General Information		**Site Information**	
Analyst	MS	Intersection	Wisteria @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Wisteria Dr
Analysis Year	2019	North/South Street	Clower St
Time Analyzed	Existing PM	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			804	55		53	551			59		82				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

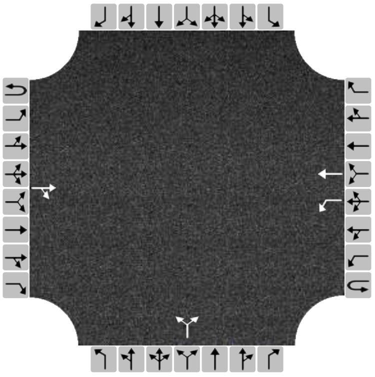
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						54					144					
Capacity, c (veh/h)						766					198					
v/c Ratio						0.07					0.73					
95% Queue Length, Q_{95} (veh)						0.2					4.7					
Control Delay (s/veh)						10.1					60.7					
Level of Service, LOS						B					F					
Approach Delay (s/veh)					0.9				60.7							
Approach LOS									F							

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Clower St
Time Analyzed	Background AM	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			323	25		57	845			90		11				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

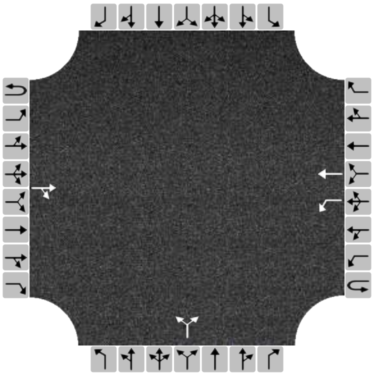
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						60					107					
Capacity, c (veh/h)						1186					169					
v/c Ratio						0.05					0.63					
95% Queue Length, Q_{95} (veh)						0.2					3.6					
Control Delay (s/veh)						8.2					57.4					
Level of Service, LOS						A					F					
Approach Delay (s/veh)					0.5				57.4							
Approach LOS									F							

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Clower St
Time Analyzed	Background PM	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume, V (veh/h)			870	60		57	596			64		89				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

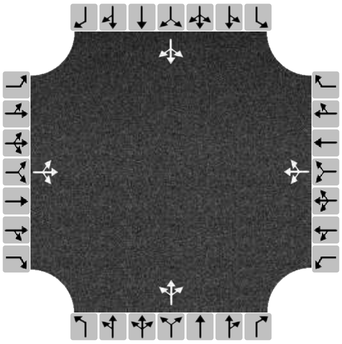
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						58					156					
Capacity, c (veh/h)						719					169					
v/c Ratio						0.08					0.92					
95% Queue Length, Q_{95} (veh)						0.3					6.9					
Control Delay (s/veh)						10.4					105.1					
Level of Service, LOS						B					F					
Approach Delay (s/veh)					0.9				105.1							
Approach LOS									F							

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria Dr @ Clower St
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Clower St
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.95
Time Analyzed	Project AM		
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	6	339	36	59	854	5	90	11	12	6	10	10
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	401			966			119			27		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.356			0.859			0.106			0.024		
Final Departure Headway, hd (s)	5.29			5.02			6.71			6.77		
Final Degree of Utilization, x	0.590			1.348			0.222			0.051		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.29			3.02			4.71			4.77		

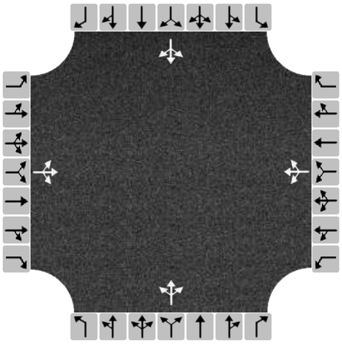
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	401			966			119			27		
Capacity	680			717			537			532		
95% Queue Length, Q_{95} (veh)	3.9			40.2			0.8			0.2		
Control Delay (s/veh)	15.6			182.0			11.6			10.1		
Level of Service, LOS	C			F			B			B		
Approach Delay (s/veh)	15.6			182.0			11.6			10.1		
Approach LOS	C			F			B			B		
Intersection Delay, s/veh | LOS	121.4						F					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	MS	Intersection	Wisteria Dr @ Clower St
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Wisteria Dr
Analysis Year	2023	North/South Street	Clower St
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.98
Time Analyzed	Project PM		
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	21	912	88	64	626	16	64	36	93	15	26	26
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	1042			720			197			68		
Percent Heavy Vehicles	2			2			2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.926			0.640			0.175			0.061		
Final Departure Headway, hd (s)	5.93			5.98			7.18			7.84		
Final Degree of Utilization, x	1.717			1.197			0.393			0.149		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.93			3.98			5.18			5.84		

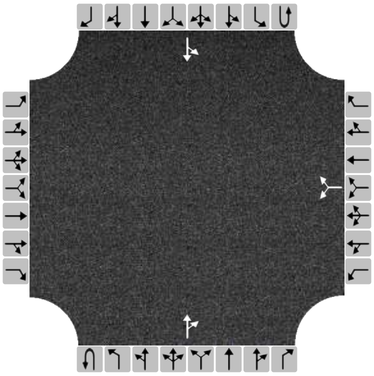
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	1042			720			197			68		
Capacity	607			602			502			459		
95% Queue Length, Q_{95} (veh)	60.8			25.5			1.8			0.5		
Control Delay (s/veh)	345.0			125.5			14.7			12.2		
Level of Service, LOS	F			F			B			B		
Approach Delay (s/veh)	345.0			125.5			14.7			12.2		
Approach LOS	F			F			B			B		
Intersection Delay, s/veh | LOS	223.7						F					

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	North @ Parking Deck
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	North Rd
Analysis Year	2023	North/South Street	Parking Deck
Time Analyzed	Project AM	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						7		4			2	0		6	174	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

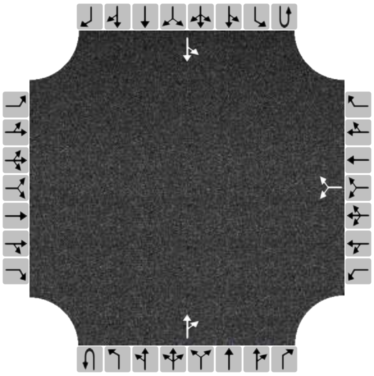
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							12							7		
Capacity, c (veh/h)							857							1612		
v/c Ratio							0.01							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							9.3							7.2		
Level of Service, LOS							A							A		
Approach Delay (s/veh)					9.3								0.3			
Approach LOS					A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	North @ Parking Deck
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	North Rd
Analysis Year	2023	North/South Street	Parking Deck
Time Analyzed	Project PM	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						18		10			5	0		21	281	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

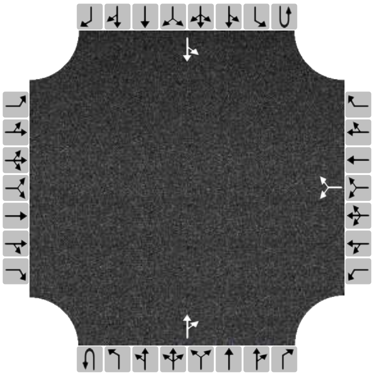
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							31							23		
Capacity, c (veh/h)							739							1608		
v/c Ratio							0.04							0.01		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							10.1							7.3		
Level of Service, LOS							B							A		
Approach Delay (s/veh)					10.1								0.6			
Approach LOS					B											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Street B @ Street C
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Street C
Analysis Year	2023	North/South Street	Street B
Time Analyzed	Project AM	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						7		3			5	3		3	3	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

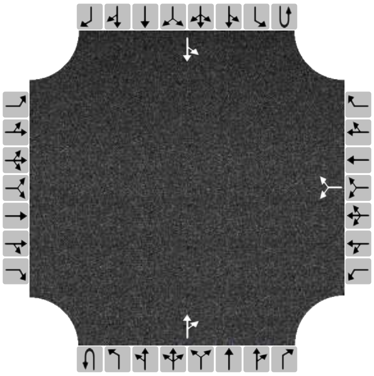
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							11							3		
Capacity, c (veh/h)							1017							1604		
v/c Ratio							0.01							0.00		
95% Queue Length, Q_{95} (veh)							0.0							0.0		
Control Delay (s/veh)							8.6							7.2		
Level of Service, LOS							A							A		
Approach Delay (s/veh)					8.6								3.6			
Approach LOS					A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Street B @ Street C
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Street C
Analysis Year	2023	North/South Street	Street B
Time Analyzed	Project PM	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						18		8			16	11		9	10	
Percent Heavy Vehicles (%)						3		3						3		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.43		6.23						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.33						2.23		

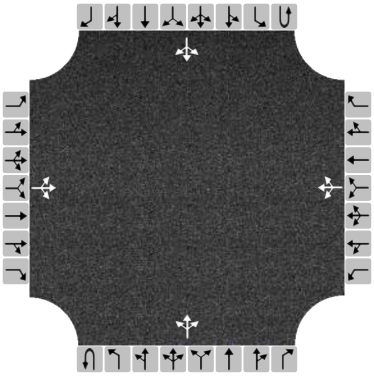
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)							29							10		
Capacity, c (veh/h)							975							1576		
v/c Ratio							0.03							0.01		
95% Queue Length, Q_{95} (veh)							0.1							0.0		
Control Delay (s/veh)							8.8							7.3		
Level of Service, LOS							A							A		
Approach Delay (s/veh)					8.8								3.5			
Approach LOS					A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Clower @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Clower St
Analysis Year	2019	North/South Street	City Hall Dr
Time Analyzed	Existing AM	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		0	1	1		4	0	7		1	87	6		23	71	0
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			2				14			1				28		
Capacity, c (veh/h)			762				827			1500				1467		
v/c Ratio			0.00				0.02			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.1		
Control Delay (s/veh)			9.7				9.4			7.4				7.5		
Level of Service, LOS			A				A			A				A		
Approach Delay (s/veh)	9.7				9.4				0.1				1.9			
Approach LOS	A				A											

Georgia Department of Transportation

Roundabout Analysis Tool

v 4.1
5/19/17

Welcome to GDOT's Roundabout Analysis Tool. This tool is designed for the user to determine the functionality of a proposed roundabout. The analysis is based on the Highway Capacity Manual 2010 Edition and 6th Edition Methodologies, NCHRP Report 672, and FHWA's Roundabout Informational Guide. Please read the notes in the Instructions tab before using the spreadsheet.

Analyst:	MS
Agency/Company:	Wolverton
Date:	11/8/2019
Project Name or PI#:	19-LD-006: Snellville Town Center
Year, Peak Period:	2023 Project AM-Alt1
County/District:	City of Snellville
Intersection:	Wisteria @ Clower

Insert Project Information Here in the BLUE SPACE. This information is linked to the Mini, Single Lane and Multi Lane Worksheets.

Roundabout Considerations Worksheet

Roundabouts may not operate well if there is too much traffic entering the intersection or if the percentage of traffic on the major road is too high. Candidate intersections shall be analyzed to determine whether a roundabout will perform acceptably. Shown below are planning level thresholds. A capacity analysis should be performed to determine lane configuration based on traffic volumes.

# of circulatory lanes	ADTs (current/ build year)	Condition met?	% traffic on Major Road	Condition met?
Mini	less than 15,000		less than 90%	
Single Lane	less than 25,000	Yes	less than 90%	Yes
Multi-Lane	less than 45,000		less than 90%	

Other things to consider when evaluating roundabouts as an alternative are Right of Way, sight distance, environmental impacts, and access to adjacent properties.

Volume Information (for Analysis Time Period)

1 Enter the Major/Minor Street ADT Volumes in the Chart below:

	Volumes	Split
Major Street	19,105	86%
Minor Street	3,042	14%
Total volumes	22,147	

Proximity to Other Intersections

2 How close is the nearest signal (miles or feet)? 0 mi 1000 '

3 Is the proposed intersection located within a coordinated signal network? No

Go up to next section...

Georgia Department of Transportation

Proposed Design Configuration Chart

Directions for this Section only: *(see **Instructions Tab** for other sections)*

1. Select the type of roundabout you are analyzing.
2. Key in the number of approaches and the street names at the proposed intersections.
3. Complete the Approach Characteristics Chart:
   a. Select the Street Name from the pulldown menu for each approach leg
   b. Select the Lane Type for each entry apporach lane
      **The first box is the inner lane, the second box is the outer lane*
   c. Select Yes or No if a right turn bypass will be added to each approach leg

Roundabout Characteristics

Roundabout Type: Single Lane
\# of Approaches: 4
Name of Streets: Wisteria Dr
Clower St

Chart Key:

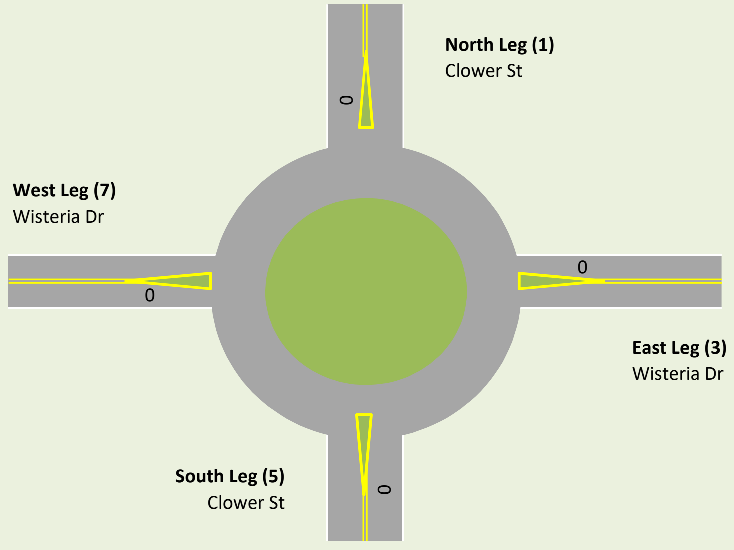
Mini/Single Lane	Street Name	
	All	
	Bypass?	
Multi-lane	Street Name	
	Inner Ln	Outer Ln
	Bypass?	

Approach Leg Characteristics:

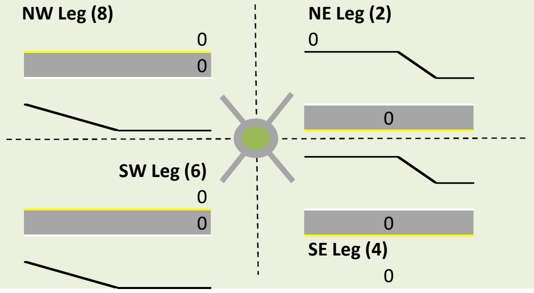
	North Leg (1)	NE Leg (2)	East Leg (3)	SE Leg (4)
Street Name:	Clower St		Wisteria Dr	
Entry Lane Config				
Bypass to Adj Leg?				
	South Leg (5)	**SW Leg (6)**	**West Leg (7)**	**NW Leg (8)**
Street Name:	Clower St		Wisteria Dr	
Entry Lane Config				
Bypass to Adj Leg?				

Georgia Department of Transportation

Preliminary Roundabout Rendering**



Additional Legs

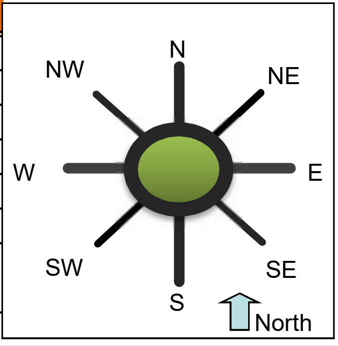


*****Note***
This roundabout sketch does not include the secondary cardinal direction legs due to restrictions in the Excel software. For complex roundabouts, a separate sketch is recommended by the designer.

General & Site Information

v 4.1

Analyst:	MS
Agency/Co:	Wolverton
Date:	11/8/2019
Project or PI#:	19-LD-006: Snellville Town Center
Year, Peak Hour:	2023 Project AM-Alt1
County/District:	City of Snellville
Intersection Name:	Wisteria @ Clower



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph			5		11		6	
	NE (2), vph								
	E (3), vph	6				12		339	
	SE (4), vph								
	S (5), vph	10		59				36	
	SW (6), vph								
	W (7), vph	10		854		90			
	NW (8), vph								
Output	Total Vehicles	26	0	918	0	113	0	381	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
% Heavy Vehicles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Bicycle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*	*0.95*
F_{HV}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	5	0	12	0	6	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	6	0	0	0	13	0	357	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	11	0	62	0	0	0	38	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	11	0	899	0	95	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	27	0	966	0	119	0	401	0
Conflicting flow, pcu/h	1056	0	113	0	369	0	79	0

Results: Approach Measures of Effectiveness

HCM 2010 Edition	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	393	NA	1010	NA	781	NA	1044	NA
Entry Flow Rates, vph	27	NA	966	NA	119	NA	401	NA
V/C ratio	**0.07**		**0.96**		**0.15**		**0.38**	
Control Delay, sec/pcu	**10**		**39**		**6**		**8**	
LOS	B		E		A		A	
95th % Queue (ft)	**6**		**413**		**13**		**46**	

Notes:

v 4.0

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Edition)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

Georgia Department of Transportation

Roundabout Analysis Tool

v 4.1
5/19/17

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Agency/Company:	Wolverton
Date:	11/8/2019
Project Name or PI#:	19-LD-006: Snellville Town Center
Year, Peak Period:	2023 Project PM-Alt1
County/District:	City of Snellville
Intersection:	Wisteria @ Clower

Insert Project Information Here in the BLUE SPACE. This information is linked to the Mini, Single Lane and Multi Lane Worksheets.

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Total volumes	22,147	

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Georgia Department of Transportation

Proposed Design Configuration Chart

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   - b. Select the Lane Type for each entry apporach lane
     **The first box is the inner lane, the second box is the outer lane*
   - c. Select Yes or No if a right turn bypass will be added to each approach leg

Roundabout Characteristics

Roundabout Type: Single Lane
\# of Approaches: 4
Name of Streets: Wisteria Dr
Clower St

Chart Key:

Mini/Single Lane	Street Name	
	All	
	Bypass?	
Multi-lane	Street Name	
	Inner Ln	Outer Ln
	Bypass?	

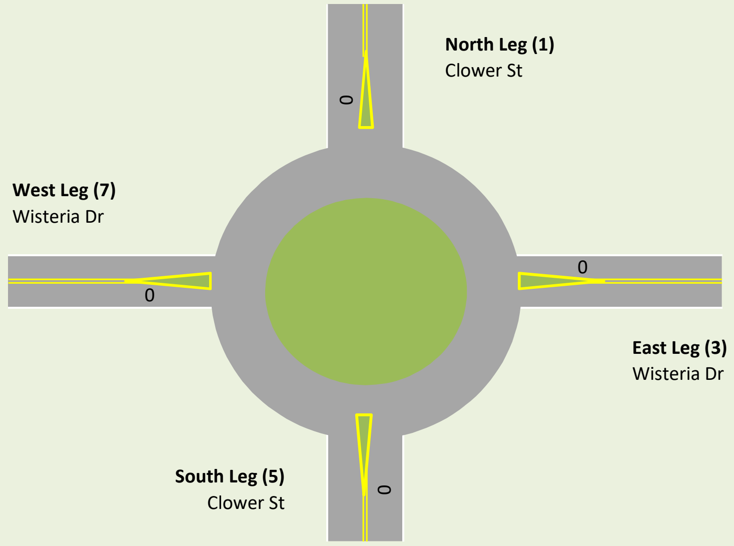
Approach Leg Characteristics:

	North Leg (1)	NE Leg (2)	East Leg (3)	SE Leg (4)
Street Name:	Clower St		Wisteria Dr	
Entry Lane Config				
Bypass to Adj Leg?				

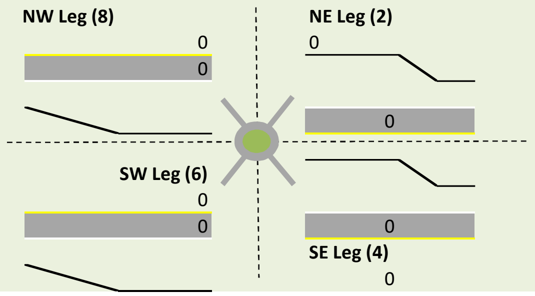
	South Leg (5)	SW Leg (6)	West Leg (7)	NW Leg (8)
Street Name:	Clower St		Wisteria Dr	
Entry Lane Config				
Bypass to Adj Leg?				

Georgia Department of Transportation

Preliminary Roundabout Rendering**



Additional Legs



*****Note***
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General & Site Information

v 4.1

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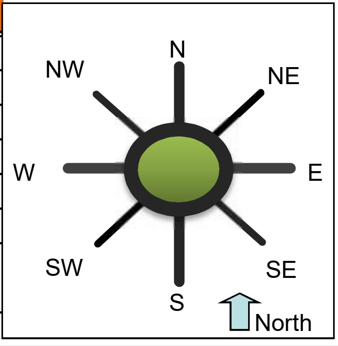
Agency/Co:	Wolverton
Date:	11/8/2019
Project or PI#:	19-LD-006: Snellville Town Center
Year, Peak Hour:	2023 Project PM-Alt1
County/District:	City of Snellville
Intersection Name:	Wisteria @ Clower



Volumes

		Entry Legs (FROM)							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Exit Legs (TO)	N (1), vph			16		36		21	
	NE (2), vph								
	E (3), vph	15				93		912	
	SE (4), vph								
	S (5), vph	26		64				88	
	SW (6), vph								
	W (7), vph	26		626		64			
	NW (8), vph								
Output	Total Vehicles	67	0	706	0	193	0	1021	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Cars	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
% Heavy Vehicles	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% Bicycle	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
# of Pedestrians **(ped/hr)**	0	0	0	0	0	0	0	0
PHF	*0.98*	*0.98*	*0.98*	*0.98*	*0.98*	*0.98*	*0.98*	*0.98*
F_{HV}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
F_{ped}	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	16	0	37	0	21	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	15	0	0	0	95	0	931	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	27	0	65	0	0	0	90	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	27	0	639	0	65	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	68	0	720	0	197	0	1042	0
Conflicting flow, pcu/h	769	0	123	0	967	0	107	0

Results: Approach Measures of Effectiveness

HCM 2010 Edition	N	NE	E	SE	S	SW	W	NW
Entry Capacity, vph	524	NA	999	NA	430	NA	1015	NA
Entry Flow Rates, vph	68	NA	720	NA	197	NA	1042	NA
V/C ratio	**0.13**		**0.72**		**0.46**		**1.03**	
Control Delay, sec/pcu	**9**		**16**		**18**		**55**	
LOS	A		C		C		F	
95th % Queue (ft)	**11**		**163**		**59**		**538**	

Notes:

v 4.0

Unit Legend:
vph = vehicles per hour
PHF = peak hour factor
F_{HV} = heavy vehicle factor
pcu = passenger car unit

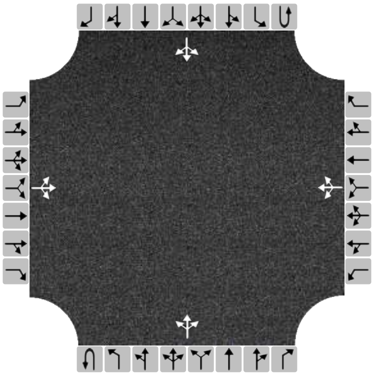
Bypass Lane Merge Point Analysis (if applicable)

Bypass Characteristics	Bypass #1	Bypass #2	Bypass #3	Bypass #4	Bypass #5	Bypass #6
Select Entry Leg from Bypass (FROM)						
Select Exit Leg for Bypass (TO)						
Does the bypass have a dedicated receiving lane?						
Volumes						
Right Turn Volume removed from Entry Leg						
Volume Characteristics (for entry leg)						
PHF						
F_{HV}						
F_{ped}						
NOTE: Volume Characteristics for Exit Leg are already taken into account						
Entry/Conflicting Flows						
Entry Flow, pcu/hr						
Conflicting Flow, pcu/hr						
Bypass Lane Results (HCM 2010 Edition)						
Entry Capacity of Bypass, vph						
Flow Rates of Exiting Traffic, vph						
V/C ratio						
Control Delay, s/veh						
LOS						
95th % Queue (ft)						
Approach w/Bypass Delay, s/veh						
Approach w/Bypass LOS						

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Clower @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Clower St
Analysis Year	2019	North/South Street	City Hall Dr
Time Analyzed	Existing PM	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		0	0	0		9	0	34		0	109	8		8	102	1
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

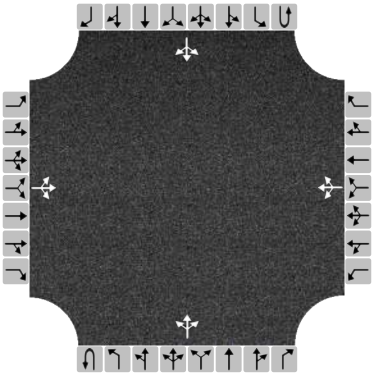
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			0				44			0				8		
Capacity, c (veh/h)			0				888			1478				1461		
v/c Ratio							0.05			0.00				0.01		
95% Queue Length, Q_{95} (veh)							0.2			0.0				0.0		
Control Delay (s/veh)			5.0				9.3			7.4				7.5		
Level of Service, LOS			A				A			A				A		
Approach Delay (s/veh)	5.0				9.3				0.0				0.6			
Approach LOS	A				A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Clower @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Clower St
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Background AM	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		0	1	1		4	0	8		1	94	6		25	77	0
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

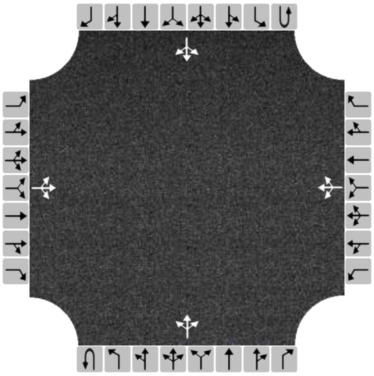
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			2				15			1				31		
Capacity, c (veh/h)			746				816			1491				1456		
v/c Ratio			0.00				0.02			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.1		
Control Delay (s/veh)			9.8				9.5			7.4				7.5		
Level of Service, LOS			A				A			A				A		
Approach Delay (s/veh)	9.8				9.5				0.1				2.0			
Approach LOS	A				A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Clower @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Clower St
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Background PM	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		0	0	0		10	0	37		0	118	9		9	110	1
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		6.43	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

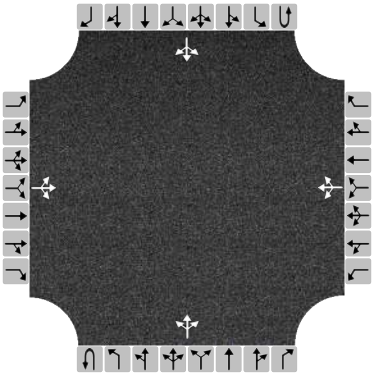
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			0				48			0				9		
Capacity, c (veh/h)			0				874			1468				1449		
v/c Ratio							0.05			0.00				0.01		
95% Queue Length, Q_{95} (veh)							0.2			0.0				0.0		
Control Delay (s/veh)			5.0				9.4			7.5				7.5		
Level of Service, LOS			A				A			A				A		
Approach Delay (s/veh)	5.0				9.4				0.0				0.6			
Approach LOS	A				A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Clower @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Clower St
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Project AM	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		2	1	3		4	0	8		2	105	6		25	87	2
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.13	6.53	6.23		7.13	6.53	6.23		4.13				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.53	4.03	3.33		3.53	4.03	3.33		2.23				2.23		

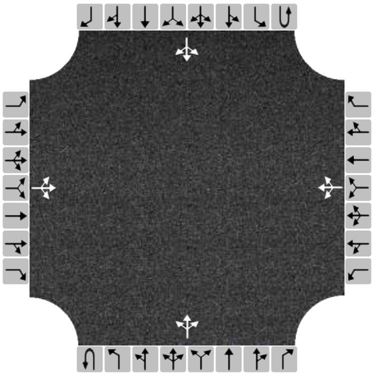
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			7				15			2				31		
Capacity, c (veh/h)			763				791			1473				1439		
v/c Ratio			0.01				0.02			0.00				0.02		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.1		
Control Delay (s/veh)			9.8				9.6			7.4				7.6		
Level of Service, LOS			A				A			A				A		
Approach Delay (s/veh)	9.8				9.6				0.1				1.8			
Approach LOS	A				A											

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Clower @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Clower St
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Project PM	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		4	0	4		10	0	37		4	154	9		9	137	7
Percent Heavy Vehicles (%)		3	3	3		3	3	3		3				3		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			8				48			4				9		
Capacity, c (veh/h)			700				806			1427				1404		
v/c Ratio			0.01				0.06			0.00				0.01		
95% Queue Length, Q_{95} (veh)			0.0				0.2			0.0				0.0		
Control Delay (s/veh)			10.2				9.8			7.5				7.6		
Level of Service, LOS			B				A			A				A		
Approach Delay (s/veh)	10.2				9.8				0.2				0.5			
Approach LOS	B				A											

9: SR 124 & Oak Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	104	110	84	150	204	284	54	1619	27	69	1456	33
v/c Ratio	0.57	0.45	0.26	0.56	0.77	0.83	0.25	0.74	0.03	0.40	0.65	0.03
Control Delay	67.8	76.3	3.7	65.9	91.9	57.9	17.6	28.2	0.0	16.8	23.8	0.1
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	67.8	76.3	3.7	65.9	91.9	57.9	17.6	28.2	0.0	16.8	23.8	0.1
Queue Length 50th (ft)	102	123	0	151	237	180	18	666	0	24	562	0
Queue Length 95th (ft)	150	180	11	208	314	282	41	937	0	50	743	0
Internal Link Dist (ft)		958			895			924			694	
Turn Bay Length (ft)	230		100	145		125	240		140	185		165
Base Capacity (vph)	183	392	431	268	412	456	218	2190	1016	183	2245	1039
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	0.57	0.28	0.19	0.56	0.50	0.62	0.25	0.74	0.03	0.38	0.65	0.03

Intersection Summary

9: SR 124 & Oak Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	98	103	79	141	192	267	51	1522	25	65	1369	31
Future Volume (veh/h)	98	103	79	141	192	267	51	1522	25	65	1369	31
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	104	110	84	150	204	284	54	1619	0	69	1456	0
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	228	194	232	249	212	172	1910	855	137	1909	854
Arrive On Green	0.05	0.12	0.12	0.06	0.13	0.13	0.03	0.54	0.00	0.03	0.54	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	104	110	84	150	204	284	54	1619	0	69	1456	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.1	9.9	8.8	11.4	19.2	18.2	0.0	69.9	0.0	3.1	57.9	0.0
Cycle Q Clear(g_c), s	9.1	9.9	8.8	11.4	19.2	18.2	0.0	69.9	0.0	3.1	57.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	157	228	194	232	249	212	172	1910	855	137	1909	854
V/C Ratio(X)	0.66	0.48	0.43	0.65	0.82	1.34	0.31	0.85	0.00	0.51	0.76	0.00
Avail Cap(c_a), veh/h	157	392	333	232	413	351	209	1910	855	174	1909	854
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.5	73.6	73.2	67.0	75.9	44.6	59.9	35.1	0.0	34.9	32.4	0.0
Incr Delay (d2), s/veh	9.9	1.6	1.5	6.0	6.5	174.4	1.0	4.9	0.0	2.9	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	5.2	4.0	1.9	10.4	18.3	2.4	35.3	0.0	1.8	29.1	0.0
LnGrp Delay(d),s/veh	74.4	75.2	74.7	73.1	82.4	219.0	60.9	40.0	0.0	37.8	35.4	0.0
LnGrp LOS	E	E	E	E	F	F	E	D		D	D	
Approach Vol, veh/h		298			638			1673			1525	
Approach Delay, s/veh		74.8			141.0			40.7			35.5	
Approach LOS		E			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	103.0	17.0	29.2	11.2	103.0	15.0	31.2
Change Period (Y+Rc), s	* 5.9	5.9	5.6	7.1	* 6.2	* 5.9	5.6	7.1
Max Green Setting (Gmax), s	* 9.1	97.1	11.4	37.9	* 8.8	* 97	9.4	39.9
Max Q Clear Time (g_c+I1), s	2.0	59.9	13.4	11.9	5.1	71.9	11.1	21.2
Green Ext Time (p_c), s	3.9	13.6	0.0	3.1	0.0	13.5	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	56.7
HCM 2010 LOS	E

Notes

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	154	271	202	149	217	207	61	1526	72	144	1507	37
v/c Ratio	0.70	0.87	0.55	0.88	0.77	0.58	0.31	0.76	0.08	0.70	0.74	0.04
Control Delay	71.1	99.7	31.0	98.4	91.4	30.2	27.2	34.2	1.6	44.1	31.3	0.1
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	71.1	99.7	31.0	98.4	91.4	30.2	27.2	34.2	1.6	44.1	31.3	0.1
Queue Length 50th (ft)	146	314	81	141	248	74	24	734	0	71	687	0
Queue Length 95th (ft)	215	#427	172	#213	346	167	45	873	14	157	801	0
Internal Link Dist (ft)		958			895			924			694	
Turn Bay Length (ft)	230		100	145		125	240		140	185		165
Base Capacity (vph)	222	350	399	170	319	386	198	2001	936	233	2044	954
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	0.69	0.77	0.51	0.88	0.68	0.54	0.31	0.76	0.08	0.62	0.74	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	151	266	198	146	213	203	60	1495	71	141	1477	36
Future Volume (veh/h)	151	266	198	146	213	203	60	1495	71	141	1477	36
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	154	271	202	149	217	207	61	1526	0	144	1507	0
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	208	309	263	165	278	237	161	1872	838	186	1968	881
Arrive On Green	0.07	0.17	0.17	0.06	0.15	0.15	0.02	0.53	0.00	0.05	0.56	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	154	271	202	149	217	207	61	1526	0	144	1507	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	13.3	25.6	21.9	10.4	20.2	18.8	0.0	64.3	0.0	6.7	59.3	0.0
Cycle Q Clear(g_c), s	13.3	25.6	21.9	10.4	20.2	18.8	0.0	64.3	0.0	6.7	59.3	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	208	309	263	165	278	237	161	1872	838	186	1968	881
V/C Ratio(X)	0.74	0.88	0.77	0.90	0.78	0.87	0.38	0.82	0.00	0.77	0.77	0.00
Avail Cap(c_a), veh/h	208	351	298	165	320	272	228	1872	838	254	1968	881
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.7	73.2	71.7	65.5	73.7	49.9	61.3	35.1	0.0	36.3	30.9	0.0
Incr Delay (d2), s/veh	13.2	19.5	10.2	43.8	10.3	23.5	1.5	4.0	0.0	9.7	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	14.9	10.3	4.3	11.2	9.8	2.8	32.4	0.0	4.3	29.7	0.0
LnGrp Delay(d),s/veh	73.9	92.8	81.9	109.3	84.0	73.4	62.8	39.1	0.0	46.0	33.8	0.0
LnGrp LOS	E	F	F	F	F	E	E	D		D	C	
Approach Vol, veh/h		627			573			1587			1651	
Approach Delay, s/veh		84.7			86.7			40.0			34.9	
Approach LOS		F			F			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.2	106.0	16.0	37.0	15.1	101.1	19.0	34.0
Change Period (Y+Rc), s	* 5.9	5.9	5.6	7.1	* 6.2	* 5.9	5.6	7.1
Max Green Setting (Gmax), s	* 11	100.1	10.4	33.9	* 16	* 95	13.4	30.9
Max Q Clear Time (g_c+I1), s	2.0	61.3	12.4	27.6	8.7	66.3	15.3	22.2
Green Ext Time (p_c), s	2.7	14.6	0.0	2.3	0.2	13.4	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	50.4
HCM 2010 LOS	D

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	113	118	91	163	221	307	59	1752	29	74	1577	36
v/c Ratio	0.60	0.43	0.27	0.58	0.75	0.86	0.33	0.82	0.03	0.54	0.74	0.04
Control Delay	67.1	73.2	4.6	64.6	87.6	64.5	29.0	33.0	0.0	34.2	29.5	0.1
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	67.1	73.2	4.6	64.6	87.6	64.5	29.0	33.0	0.0	34.2	29.5	0.1
Queue Length 50th (ft)	109	130	0	162	255	219	21	818	0	27	672	0
Queue Length 95th (ft)	156	186	19	217	329	320	47	1094	0	85	901	0
Internal Link Dist (ft)		958			895			924			694	
Turn Bay Length (ft)	230		100	145		125	240		140	185		165
Base Capacity (vph)	188	392	431	281	412	450	178	2145	997	146	2135	992
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	0.60	0.30	0.21	0.58	0.54	0.68	0.33	0.82	0.03	0.51	0.74	0.04

Intersection Summary

HCM 2010 Signalized Intersection Summary

9: SR 124 & Oak Rd

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	106	111	86	153	208	289	55	1647	27	70	1482	34
Future Volume (veh/h)	106	111	86	153	208	289	55	1647	27	70	1482	34
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	113	118	91	163	221	307	59	1752	0	74	1577	0
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	247	210	238	267	227	150	1910	855	116	1909	854
Arrive On Green	0.05	0.13	0.13	0.06	0.14	0.14	0.03	0.54	0.00	0.03	0.54	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	113	118	91	163	221	307	59	1752	0	74	1577	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.4	10.6	9.5	11.4	20.8	19.8	0.0	81.2	0.0	3.4	66.6	0.0
Cycle Q Clear(g_c), s	9.4	10.6	9.5	11.4	20.8	19.8	0.0	81.2	0.0	3.4	66.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	157	247	210	238	267	227	150	1910	855	116	1909	854
V/C Ratio(X)	0.72	0.48	0.43	0.68	0.83	1.35	0.39	0.92	0.00	0.64	0.83	0.00
Avail Cap(c_a), veh/h	157	392	333	238	413	351	184	1910	855	151	1909	854
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.4	72.3	71.9	66.8	74.9	45.2	70.3	37.8	0.0	41.1	34.4	0.0
Incr Delay (d2), s/veh	14.7	1.4	1.4	7.8	7.9	179.7	1.7	8.5	0.0	5.7	4.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	5.5	4.3	2.7	11.3	20.0	2.9	41.9	0.0	2.2	33.5	0.0
LnGrp Delay(d),s/veh	79.1	73.8	73.3	74.6	82.8	224.8	72.0	46.3	0.0	46.7	38.7	0.0
LnGrp LOS	E	E	E	E	F	F	E	D		D	D	
Approach Vol, veh/h		322			691			1811			1651	
Approach Delay, s/veh		75.5			144.0			47.1			39.0	
Approach LOS		E			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	103.0	17.0	30.9	11.5	103.0	15.0	32.9
Change Period (Y+Rc), s	* 5.9	5.9	5.6	7.1	* 6.2	* 5.9	5.6	7.1
Max Green Setting (Gmax), s	* 9.1	97.1	11.4	37.9	* 8.8	* 97	9.4	39.9
Max Q Clear Time (g_c+I1), s	2.0	68.6	13.4	12.6	5.4	83.2	11.4	22.8
Green Ext Time (p_c), s	4.0	13.7	0.0	3.4	0.0	9.8	0.0	3.1

Intersection Summary			
HCM 2010 Ctrl Delay			61.1
HCM 2010 LOS			E

Notes

9: SR 124 & Oak Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	166	294	218	161	236	224	66	1651	79	156	1609	40
v/c Ratio	0.77	0.90	0.57	0.99	0.80	0.61	0.38	0.85	0.09	0.84	0.80	0.04
Control Delay	76.7	102.3	34.2	122.8	92.9	33.5	41.5	40.6	2.2	81.9	34.9	0.1
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	76.7	102.3	34.2	122.8	92.9	33.5	41.5	40.6	2.2	81.9	34.9	0.1
Queue Length 50th (ft)	156	340	99	151	269	93	27	892	0	130	797	0
Queue Length 95th (ft)	#246	#495	195	#273	375	193	53	1004	19	#252	897	0
Internal Link Dist (ft)		958			895			924			694	
Turn Bay Length (ft)	230		100	145		125	240		140	185		165
Base Capacity (vph)	216	350	399	163	319	386	172	1941	911	199	2015	942
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	0.77	0.84	0.55	0.99	0.74	0.58	0.38	0.85	0.09	0.78	0.80	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
9: SR 124 & Oak Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	163	288	214	158	231	220	65	1618	77	153	1577	39
Future Volume (veh/h)	163	288	214	158	231	220	65	1618	77	153	1577	39
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	166	294	218	161	236	224	66	1651	0	156	1609	0
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	327	278	161	296	252	153	1872	837	176	1968	881
Arrive On Green	0.07	0.18	0.18	0.06	0.16	0.16	0.03	0.53	0.00	0.06	0.56	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	166	294	218	161	236	224	66	1651	0	156	1609	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	13.4	27.8	23.7	10.4	22.0	20.6	0.0	74.1	0.0	8.0	66.6	0.0
Cycle Q Clear(g_c), s	13.4	27.8	23.7	10.4	22.0	20.6	0.0	74.1	0.0	8.0	66.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	206	327	278	161	296	252	153	1872	837	176	1968	881
V/C Ratio(X)	0.80	0.90	0.78	1.00	0.80	0.89	0.43	0.88	0.00	0.89	0.82	0.00
Avail Cap(c_a), veh/h	206	351	298	161	320	272	208	1872	837	231	1968	881
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	61.2	72.6	70.9	66.3	72.9	50.6	69.7	37.4	0.0	43.6	32.5	0.0
Incr Delay (d2), s/veh	20.1	23.8	12.0	70.2	12.3	27.0	1.9	6.4	0.0	26.4	3.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	16.5	11.3	6.0	12.4	10.9	3.3	37.9	0.0	9.0	33.5	0.0
LnGrp Delay(d),s/veh	81.3	96.4	82.9	136.5	85.2	77.5	71.6	43.9	0.0	70.0	36.4	0.0
LnGrp LOS	F	F	F	F	F	E	E	D		E	D	
Approach Vol, veh/h		678			621			1717			1765	
Approach Delay, s/veh		88.4			95.7			44.9			39.4	
Approach LOS		F			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	106.0	16.0	38.7	16.4	101.1	19.0	35.7
Change Period (Y+Rc), s	* 5.9	5.9	5.6	7.1	* 6.2	* 5.9	5.6	7.1
Max Green Setting (Gmax), s	* 11	100.1	10.4	33.9	* 16	* 95	13.4	30.9
Max Q Clear Time (g_c+I1), s	2.0	68.6	12.4	29.8	10.0	76.1	15.4	24.0
Green Ext Time (p_c), s	3.9	14.8	0.0	1.8	0.2	11.6	0.0	2.7

Intersection Summary			
HCM 2010 Ctrl Delay			55.6
HCM 2010 LOS			E

Notes

9: SR 124 & Oak Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	113	118	91	184	221	318	59	1759	41	80	1577	36
v/c Ratio	0.59	0.42	0.27	0.65	0.74	0.88	0.34	0.83	0.04	0.58	0.74	0.04
Control Delay	65.8	72.3	4.5	67.9	85.9	67.9	29.8	34.2	0.1	40.8	29.9	0.1
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	65.8	72.3	4.5	67.9	85.9	67.9	29.8	34.2	0.1	40.8	29.9	0.1
Queue Length 50th (ft)	108	129	0	183	253	233	22	850	0	30	685	0
Queue Length 95th (ft)	156	186	19	244	329	338	47	1103	0	98	901	0
Internal Link Dist (ft)		958			895			924			694	
Turn Bay Length (ft)	230		100	145		125	240		140	185		165
Base Capacity (vph)	192	392	431	285	412	450	176	2127	990	145	2125	988
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	0.59	0.30	0.21	0.65	0.54	0.71	0.34	0.83	0.04	0.55	0.74	0.04

Intersection Summary

HCM 2010 Signalized Intersection Summary
9: SR 124 & Oak Rd

Snellville Town Center
2023 Project AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	106	111	86	173	208	299	55	1653	39	75	1482	34
Future Volume (veh/h)	106	111	86	173	208	299	55	1653	39	75	1482	34
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	113	118	91	184	221	318	59	1759	0	80	1577	0
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	247	210	239	268	228	153	1910	854	118	1909	854
Arrive On Green	0.05	0.13	0.13	0.06	0.14	0.14	0.03	0.54	0.00	0.03	0.54	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	113	118	91	184	221	318	59	1759	0	80	1577	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.4	10.6	9.5	11.4	20.7	19.8	0.0	81.9	0.0	3.6	66.6	0.0
Cycle Q Clear(g_c), s	9.4	10.6	9.5	11.4	20.7	19.8	0.0	81.9	0.0	3.6	66.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	157	247	210	239	268	228	153	1910	854	118	1909	854
V/C Ratio(X)	0.72	0.48	0.43	0.77	0.83	1.40	0.39	0.92	0.00	0.68	0.83	0.00
Avail Cap(c_a), veh/h	157	392	333	239	413	351	184	1910	854	150	1909	854
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	64.4	72.3	71.8	68.9	74.9	45.2	70.0	37.9	0.0	41.4	34.4	0.0
Incr Delay (d2), s/veh	14.7	1.4	1.4	14.3	7.9	200.1	1.6	8.8	0.0	8.2	4.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	5.5	4.3	4.4	11.3	21.3	2.9	42.2	0.0	2.4	33.5	0.0
LnGrp Delay(d),s/veh	79.1	73.7	73.3	83.2	82.7	245.3	71.6	46.7	0.0	49.6	38.7	0.0
LnGrp LOS	E	E	E	F	F	F	E	D		D	D	
Approach Vol, veh/h		322			723			1818			1657	
Approach Delay, s/veh		75.5			154.4			47.5			39.2	
Approach LOS		E			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.8	103.0	17.0	31.0	11.8	103.0	15.0	33.0
Change Period (Y+Rc), s	* 5.9	5.9	5.6	7.1	* 6.2	* 5.9	5.6	7.1
Max Green Setting (Gmax), s	* 9.1	97.1	11.4	37.9	* 8.8	* 97	9.4	39.9
Max Q Clear Time (g_c+I1), s	2.0	68.6	13.4	12.6	5.6	83.9	11.4	22.7
Green Ext Time (p_c), s	4.3	13.7	0.0	3.4	0.0	9.5	0.0	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	63.6
HCM 2010 LOS	E

Notes

Queues
9: SR 124 & Oak Rd

Snellville Town Center
2023 Project PM

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	166	294	218	215	236	250	66	1670	117	171	1632	40
v/c Ratio	0.77	0.90	0.57	1.32	0.80	0.66	0.40	0.87	0.13	0.89	0.81	0.04
Control Delay	76.7	102.3	34.2	224.2	92.9	35.4	45.2	42.2	5.7	92.3	35.6	0.1
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	76.7	102.3	34.2	224.2	92.9	35.4	45.2	42.2	5.7	92.3	35.6	0.1
Queue Length 50th (ft)	156	340	99	~239	269	107	27	912	12	153	817	0
Queue Length 95th (ft)	#246	#495	195	#424	375	213	61	1026	47	#299	921	0
Internal Link Dist (ft)		958			895			924			694	
Turn Bay Length (ft)	230		100	145		125	240		140	185		165
Base Capacity (vph)	216	350	399	163	319	398	166	1922	903	199	2015	942
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	0.77	0.84	0.55	1.32	0.74	0.63	0.40	0.87	0.13	0.86	0.81	0.04

Intersection Summary

~ 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.

HCM 2010 Signalized Intersection Summary

9: SR 124 & Oak Rd

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	163	288	214	211	231	245	65	1637	115	168	1599	39
Future Volume (veh/h)	163	288	214	211	231	245	65	1637	115	168	1599	39
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	166	294	218	215	236	250	66	1670	0	171	1632	0
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	206	328	279	162	297	252	166	1871	837	190	1968	881
Arrive On Green	0.07	0.18	0.18	0.06	0.16	0.16	0.04	0.53	0.00	0.07	0.56	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	166	294	218	215	236	250	66	1670	0	171	1632	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	13.4	27.8	23.7	10.4	22.0	23.4	0.0	75.8	0.0	9.9	68.4	0.0
Cycle Q Clear(g_c), s	13.4	27.8	23.7	10.4	22.0	23.4	0.0	75.8	0.0	9.9	68.4	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	206	328	279	162	297	252	166	1871	837	190	1968	881
V/C Ratio(X)	0.81	0.90	0.78	1.33	0.80	0.99	0.40	0.89	0.00	0.90	0.83	0.00
Avail Cap(c_a), veh/h	206	351	298	162	320	272	203	1871	837	227	1968	881
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	61.2	72.6	70.9	66.4	72.8	51.5	69.8	37.9	0.0	48.6	32.9	0.0
Incr Delay (d2), s/veh	20.5	23.6	12.0	185.1	12.3	50.8	1.5	7.0	0.0	30.8	4.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	16.5	11.3	11.2	12.4	13.8	3.2	38.7	0.0	10.0	34.5	0.0
LnGrp Delay(d),s/veh	81.7	96.2	82.9	251.4	85.1	102.4	71.3	44.9	0.0	79.4	37.1	0.0
LnGrp LOS	F	F	F	F	F	F	E	D		E	D	
Approach Vol, veh/h		678			701			1736			1803	
Approach Delay, s/veh		88.4			142.3			45.9			41.1	
Approach LOS		F			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.2	106.0	16.0	38.8	18.2	101.0	19.0	35.8
Change Period (Y+Rc), s	* 5.9	5.9	5.6	7.1	* 6.2	* 5.9	5.6	7.1
Max Green Setting (Gmax), s	* 11	100.1	10.4	33.9	* 16	* 95	13.4	30.9
Max Q Clear Time (g_c+I1), s	2.0	70.4	12.4	29.8	11.9	77.8	15.4	25.4
Green Ext Time (p_c), s	5.7	14.7	0.0	1.9	0.1	11.1	0.0	2.3

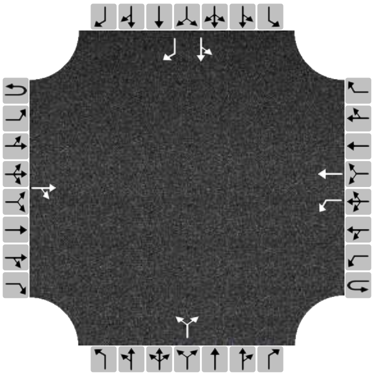
Intersection Summary	
HCM 2010 Ctrl Delay	63.7
HCM 2010 LOS	E

Notes

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Oak Rd
Analysis Year	2019	North/South Street	North Rd
Time Analyzed	Existing AM	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	1	1
Configuration				TR		L	T				LR			LT		R
Volume, V (veh/h)			219	1		5	418			10		7		55	3	152
Percent Heavy Vehicles (%)						3				3		3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						5					18			61		160
Capacity, c (veh/h)						1328					323			357		615
v/c Ratio						0.00					0.06			0.17		0.26
95% Queue Length, Q_{95} (veh)						0.0					0.2			0.6		1.0
Control Delay (s/veh)						7.7					16.8			17.1		12.9
Level of Service, LOS						A					C			C		B
Approach Delay (s/veh)					0.1				16.8				14.1			
Approach LOS									C				B			

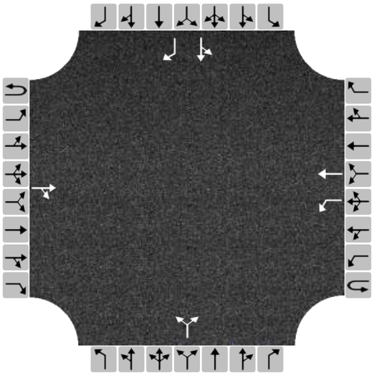
HCS7™ TWSC Version 7.2.1
10-Oak @ North_2019 Existing AM.xtw

Generated: 11/4/2019 8:55:12 AM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Oak Rd
Analysis Year	2019	North/South Street	North Rd
Time Analyzed	Existing PM	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	1	1
Configuration				TR		L	T				LR			LT		R
Volume, V (veh/h)			478	0		8	428			5		12		112	1	133
Percent Heavy Vehicles (%)						3				3		3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2		7.1	6.5	6.2
Critical Headway (sec)						4.13				7.13		6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)						2.2				3.5		3.3		3.5	4.0	3.3
Follow-Up Headway (sec)						2.23				3.53		3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						8					17			116		137
Capacity, c (veh/h)						1064					332			231		614
v/c Ratio						0.01					0.05			0.50		0.22
95% Queue Length, Q_{95} (veh)						0.0					0.2			2.6		0.8
Control Delay (s/veh)						8.4					16.4			35.4		12.5
Level of Service, LOS						A					C			E		B
Approach Delay (s/veh)					0.1				16.4				23.0			
Approach LOS									C				C			

HCS7™ TWSC Version 7.2.1

Generated: 11/1/2019 5:16:45 PM

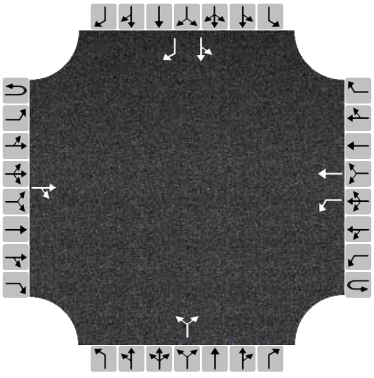
10-Oak @ North_2019 Existing PM.xtw

HCS7 Two-Way Stop-Control Report

General Information / Site Information

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	North Rd
Time Analyzed	Background AM	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	1	1
Configuration				TR		L	T				LR			LT		R
Volume, V (veh/h)			237	1		5	452			11		8		60	3	165
Percent Heavy Vehicles (%)						3				3		3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2		7.1	6.5	6.2
Critical Headway (sec)						4.13				7.13		6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)						2.2				3.5		3.3		3.5	4.0	3.3
Follow-Up Headway (sec)						2.23				3.53		3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

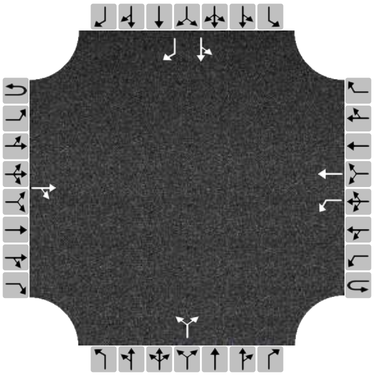
Flow Rate, v (veh/h)						5					20			66		174
Capacity, c (veh/h)						1308					288			328		587
v/c Ratio						0.00					0.07			0.20		0.30
95% Queue Length, Q_{95} (veh)						0.0					0.2			0.7		1.2
Control Delay (s/veh)						7.8					18.4			18.7		13.7
Level of Service, LOS						A					C			C		B
Approach Delay (s/veh)					0.1				18.4				15.1			
Approach LOS									C				C			

HCS7 Two-Way Stop-Control Report

General Information / Site Information

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	North Rd
Time Analyzed	Background PM	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	1	1
Configuration				TR		L	T				LR			LT		R
Volume, V (veh/h)			517	0		9	463			5		13		121	1	144
Percent Heavy Vehicles (%)						3				3		3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9					18			126		148
Capacity, c (veh/h)						1029					301			203		586
v/c Ratio						0.01					0.06			0.62		0.25
95% Queue Length, Q_{95} (veh)						0.0					0.2			3.6		1.0
Control Delay (s/veh)						8.5					17.7			47.9		13.2
Level of Service, LOS						A					C			E		B
Approach Delay (s/veh)					0.2				17.7				29.2			
Approach LOS									C				D			

HCS7™ TWSC Version 7.2.1

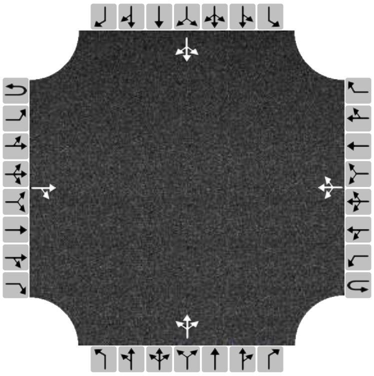
10-Oak @ North_2023 Background PM.xtw

Generated: 11/4/2019 8:56:23 AM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	North Rd
Time Analyzed	Project AM	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration				TR			LTR				LTR				LTR	
Volume, V (veh/h)			253	1		5	471	2		11	0	8		62	3	176
Percent Heavy Vehicles (%)						3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)						4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)						2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)						2.23				3.53	4.03	3.33		3.53	4.03	3.33

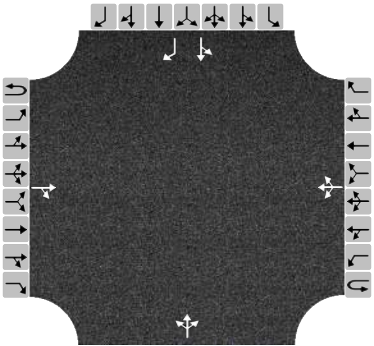
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						5					20				253	
Capacity, c (veh/h)						1290					261				465	
v/c Ratio						0.00					0.08				0.54	
95% Queue Length, Q_{95} (veh)						0.0					0.2				3.2	
Control Delay (s/veh)						7.8					19.9				21.6	
Level of Service, LOS						A					C				C	
Approach Delay (s/veh)					0.1				19.9				21.6			
Approach LOS									C				C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	North Rd
Time Analyzed	Project AM-Alt 1	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration				TR			LTR				LTR			LT		R
Volume, V (veh/h)			253	1		5	471	2		11	0	8		62	3	176
Percent Heavy Vehicles (%)						3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

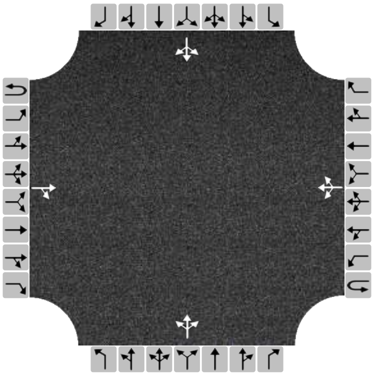
Flow Rate, v (veh/h)						5					20			68		185
Capacity, c (veh/h)						1290					261			309		571
v/c Ratio						0.00					0.08			0.22		0.32
95% Queue Length, Q_{95} (veh)						0.0					0.2			0.8		1.4
Control Delay (s/veh)						7.8					19.9			19.9		14.3
Level of Service, LOS						A					C			C		B
Approach Delay (s/veh)					0.1				19.9				15.8			
Approach LOS									C				C			

HCS7 Two-Way Stop-Control Report

General Information / Site Information

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	North Rd
Time Analyzed	Project PM	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration				TR			LTR				LTR				LTR	
Volume, V (veh/h)			571	0		9	512	5		5	0	13		129	1	174
Percent Heavy Vehicles (%)						3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

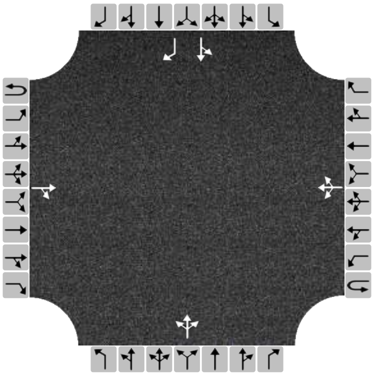
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9					18				313	
Capacity, c (veh/h)						980					241				281	
v/c Ratio						0.01					0.07				1.12	
95% Queue Length, Q_{95} (veh)						0.0					0.2				13.0	
Control Delay (s/veh)						8.7					21.1				128.2	
Level of Service, LOS						A					C				F	
Approach Delay (s/veh)					0.3				21.1				128.2			
Approach LOS									C				F			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ North
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	North Rd
Time Analyzed	Project PM-Alt 1	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration				TR			LTR				LTR			LT		R
Volume, V (veh/h)			571	0		9	512	5		5	0	13		129	1	174
Percent Heavy Vehicles (%)						3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)						4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)						2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)						2.23				3.53	4.03	3.33		3.53	4.03	3.33

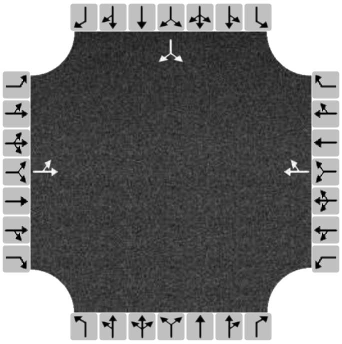
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						9					18			134		179
Capacity, c (veh/h)						980					241			170		547
v/c Ratio						0.01					0.07			0.79		0.33
95% Queue Length, Q_{95} (veh)						0.0					0.2			5.2		1.4
Control Delay (s/veh)						8.7					21.1			77.4		14.8
Level of Service, LOS						A					C			F		B
Approach Delay (s/veh)					0.3				21.1				41.6			
Approach LOS									C				E			

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak Rd @ Street A
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Street A
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Project AM		
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	5	318			483	2				3		9
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	351			527						13		
Percent Heavy Vehicles	2			2						2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.312			0.469						0.012		
Final Departure Headway, hd (s)	4.50			4.33						5.41		
Final Degree of Utilization, x	0.439			0.635						0.020		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	2.50			2.33						3.41		

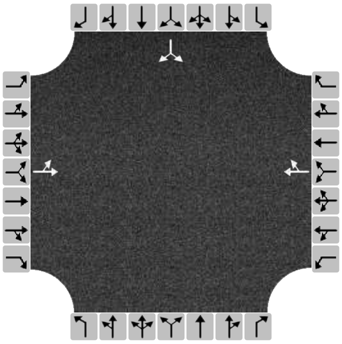
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	351			527						13		
Capacity	800			831						665		
95% Queue Length, Q_{95} (veh)	2.3			4.6						0.1		
Control Delay (s/veh)	11.0			14.5						8.5		
Level of Service, LOS	B			B						A		
Approach Delay (s/veh)	11.0			14.5						8.5		
Approach LOS	B			B						A		
Intersection Delay, s/veh | LOS	13.1						B					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak Rd @ Street A
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Street A
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.92
Time Analyzed	Project PM		
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	17	696			511	22				20		18
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	775			579						41		
Percent Heavy Vehicles	2			2						2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.689			0.515						0.037		
Final Departure Headway, hd (s)	4.76			4.87						6.58		
Final Degree of Utilization, x	1.024			0.784						0.076		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	2.76			2.87						4.58		

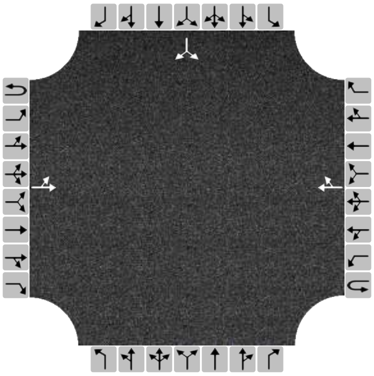
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	775			579						41		
Capacity	757			739						547		
95% Queue Length, Q_{95} (veh)	18.2			7.8						0.2		
Control Delay (s/veh)	60.3			23.1						10.1		
Level of Service, LOS	F			C						B		
Approach Delay (s/veh)	60.3			23.1						10.1		
Approach LOS	F			C						B		
Intersection Delay, s/veh | LOS	43.4						E					

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak Rd @ Street B
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Street B
Time Analyzed	Project AM	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		7	318				483	2						3		9
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

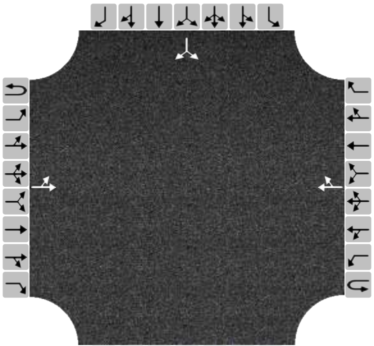
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8													13	
Capacity, c (veh/h)		1034													467	
v/c Ratio		0.01													0.03	
95% Queue Length, Q_{95} (veh)		0.0													0.1	
Control Delay (s/veh)		8.5													12.9	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	0.3												12.9			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak Rd @ Street B
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Street B
Time Analyzed	Project PM	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		24	692				508	8						7		24
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

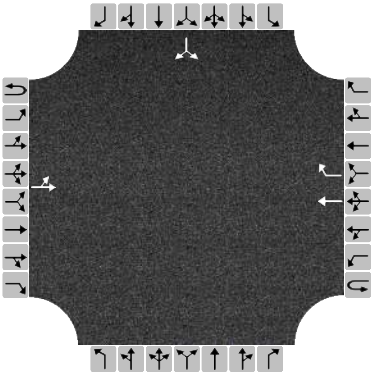
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		26													34	
Capacity, c (veh/h)		1004													341	
v/c Ratio		0.03													0.10	
95% Queue Length, Q_{95} (veh)		0.1													0.3	
Control Delay (s/veh)		8.7													16.7	
Level of Service, LOS		A													C	
Approach Delay (s/veh)	0.7												16.7			
Approach LOS													C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Oak Rd
Analysis Year	2019	North/South Street	Clower St
Time Analyzed	Existing AM	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		LT					T	R							LR	
Volume, V (veh/h)		28	217				392	68						25		44
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

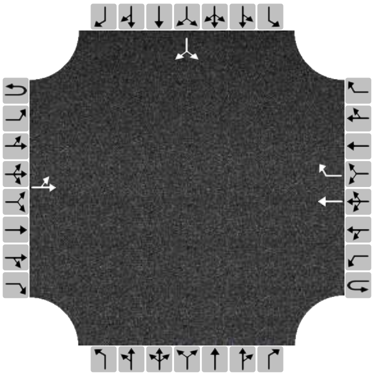
Flow Rate, v (veh/h)		30													74	
Capacity, c (veh/h)		1062													511	
v/c Ratio		0.03													0.14	
95% Queue Length, Q_{95} (veh)		0.1													0.5	
Control Delay (s/veh)		8.5													13.2	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	1.2												13.2			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information / Site Information

Analyst	MS	Intersection	Oak @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Oak Rd
Analysis Year	2019	North/South Street	Clower St
Time Analyzed	Existing PM	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		LT					T	R							LR	
Volume, V (veh/h)		51	520				388	61						51		50
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

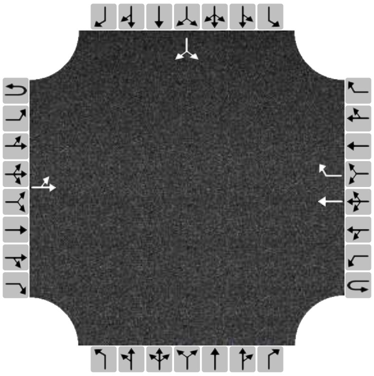
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		54													107	
Capacity, c (veh/h)		1078													337	
v/c Ratio		0.05													0.32	
95% Queue Length, Q_{95} (veh)		0.2													1.3	
Control Delay (s/veh)		8.5													20.6	
Level of Service, LOS		A													C	
Approach Delay (s/veh)	1.3												20.6			
Approach LOS													C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Clower St
Time Analyzed	Background AM	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		LT					T	R							LR	
Volume, V (veh/h)		30	235				424	74						27		48
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

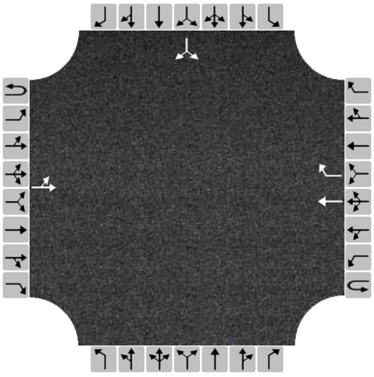
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		32													81	
Capacity, c (veh/h)		1026													482	
v/c Ratio		0.03													0.17	
95% Queue Length, Q_{95} (veh)		0.1													0.6	
Control Delay (s/veh)		8.6													14.0	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	1.2												14.0			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Clower St
Time Analyzed	Background PM	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		LT					T	R							LR	
Volume, V (veh/h)		55	563				420	66						55		54
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		59													116	
Capacity, c (veh/h)		1043													301	
v/c Ratio		0.06													0.39	
95% Queue Length, Q_{95} (veh)		0.2													1.8	
Control Delay (s/veh)		8.7													24.3	
Level of Service, LOS		A													C	
Approach Delay (s/veh)	1.4												24.3			
Approach LOS													C			

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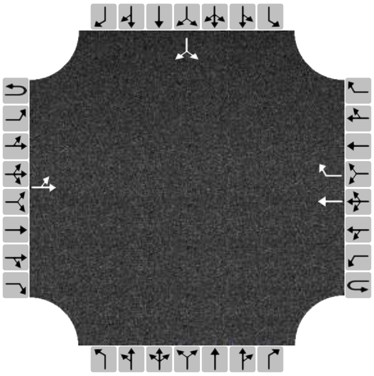
13-Oak @ Clower_2023 Background PM.xtw

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Clower St
Time Analyzed	Project AM	Peak Hour Factor	0.93
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		LT					T	R							LR	
Volume, V (veh/h)		37	246				433	79						34		52
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		40													93	
Capacity, c (veh/h)		1013													453	
v/c Ratio		0.04													0.21	
95% Queue Length, Q_{95} (veh)		0.1													0.8	
Control Delay (s/veh)		8.7													15.0	
Level of Service, LOS		A													B	
Approach Delay (s/veh)	1.5												15.0			
Approach LOS													B			

HCS7™ TWSC Version 7.2.1
13-Oak @ Clower_2023 Project AM.xtw

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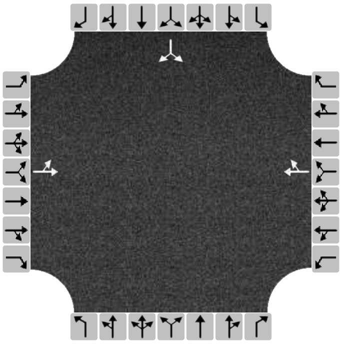
HCS7 All-Way Stop Control Report

General Information		**Site Information**	
Analyst	MS	Intersection	Oak Rd @ Clower St
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/22/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Clower St
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.93
Time Analyzed	Project AM-Alt1		
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	37	246			433	79				34		52
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	304			551						92		
Percent Heavy Vehicles	2			2						2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.270			0.489						0.082		
Final Departure Headway, hd (s)	4.84			4.48						5.56		
Final Degree of Utilization, x	0.409			0.685						0.143		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	2.84			2.48						3.56		

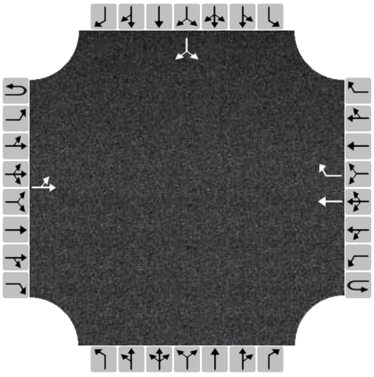
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	304			551						92		
Capacity	744			804						648		
95% Queue Length, Q_{95} (veh)	2.0			5.5						0.5		
Control Delay (s/veh)	11.1			16.6						9.5		
Level of Service, LOS	B			C						A		
Approach Delay (s/veh)	11.1			16.6						9.5		
Approach LOS	B			C						A		
Intersection Delay, s/veh | LOS	14.2						B					

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ Clower
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Clower St
Time Analyzed	Project PM	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		LT					T	R							LR	
Volume, V (veh/h)		76	590				450	85						73		66
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

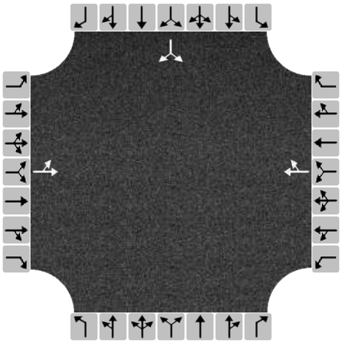
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		81													148	
Capacity, c (veh/h)		997													256	
v/c Ratio		0.08													0.58	
95% Queue Length, Q_{95} (veh)		0.3													3.3	
Control Delay (s/veh)		8.9													36.8	
Level of Service, LOS		A													E	
Approach Delay (s/veh)	2.0												36.8			
Approach LOS													E			

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak Rd @ Clower St
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/22/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	Clower St
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.98
Time Analyzed	Project PM-Alt1		
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	76	590			450	85				73		66
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LT			TR						LR		
Flow Rate, v (veh/h)	680			546						142		
Percent Heavy Vehicles	2			2						2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20						3.20		
Initial Degree of Utilization, x	0.604			0.485						0.126		
Final Departure Headway, hd (s)	5.21			5.27						6.67		
Final Degree of Utilization, x	0.984			0.799						0.263		
Move-Up Time, m (s)	2.0			2.0						2.0		
Service Time, ts (s)	3.21			3.27						4.67		

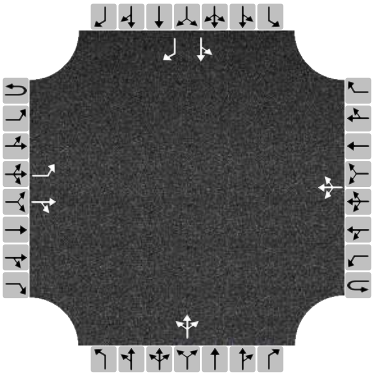
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	680			546						142		
Capacity	690			683						540		
95% Queue Length, Q_{95} (veh)	15.3			8.1						1.0		
Control Delay (s/veh)	52.9			25.8						12.0		
Level of Service, LOS	F			D						B		
Approach Delay (s/veh)	52.9			25.8						12.0		
Approach LOS	F			D						B		
Intersection Delay, s/veh | LOS	37.8						E					

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Oak Rd
Analysis Year	2019	North/South Street	City Hall Dr
Time Analyzed	Existing AM	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	1	0		0	1	1
Configuration		L		TR			LTR				LTR			LT		R
Volume, V (veh/h)		4	206	0		7	482	17		4	2	6		3	1	2
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

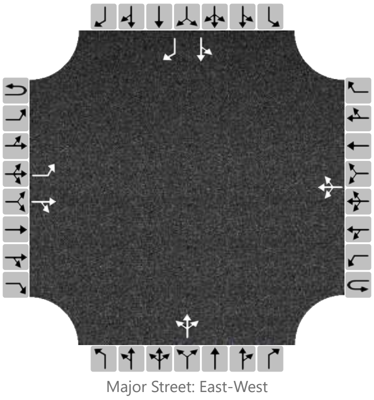
Flow Rate, v (veh/h)		4				8					13			4		2
Capacity, c (veh/h)		1009				1332					455			298		535
v/c Ratio		0.00				0.01					0.03			0.01		0.00
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1			0.0		0.0
Control Delay (s/veh)		8.6				7.7					13.2			17.2		11.7
Level of Service, LOS		A				A					B			C		B
Approach Delay (s/veh)	0.1				0.2				13.2				15.4			
Approach LOS									B				C			

HCS7 Two-Way Stop-Control Report

General Information / Site Information

Analyst	MS	Intersection	Oak @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/1/2019	East/West Street	Oak Rd
Analysis Year	2019	North/South Street	City Hall Dr
Time Analyzed	Existing PM	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	1	0		0	1	1
Configuration		L		TR			LTR				LTR			LT		R
Volume, V (veh/h)		8	546	2		7	413	20		4	0	19		11	0	18
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

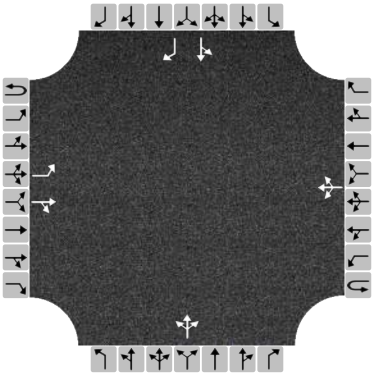
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8				7					24			11		19
Capacity, c (veh/h)		1107				1001					411			197		618
v/c Ratio		0.01				0.01					0.06			0.06		0.03
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2			0.2		0.1
Control Delay (s/veh)		8.3				8.6					14.3			24.4		11.0
Level of Service, LOS		A				A					B			C		B
Approach Delay (s/veh)	0.1				0.2				14.3				15.9			
Approach LOS									B				C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Background AM	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	1	0		0	1	1
Configuration		L		TR			LTR				LTR			LT		R
Volume, V (veh/h)		4	223	0		8	522	18		4	2	6		3	1	2
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

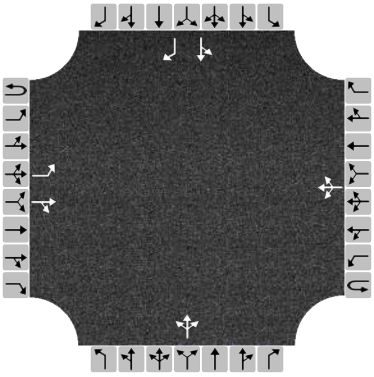
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4				9					13			4		2
Capacity, c (veh/h)		971				1310					421			270		505
v/c Ratio		0.00				0.01					0.03			0.01		0.00
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1			0.0		0.0
Control Delay (s/veh)		8.7				7.8					13.8			18.5		12.2
Level of Service, LOS		A				A					B			C		B
Approach Delay (s/veh)	0.1				0.2				13.8				16.4			
Approach LOS									B				C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/4/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Background PM	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	1	0		0	1	1
Configuration		L		TR			LTR				LTR			LT		R
Volume, V (veh/h)		8	546	2		7	413	20		4	0	19		11	0	18
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

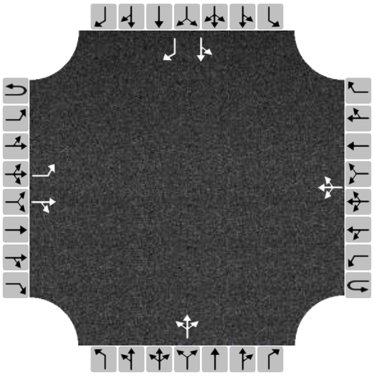
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		8				7					24			11		19
Capacity, c (veh/h)		1107				1001					411			197		618
v/c Ratio		0.01				0.01					0.06			0.06		0.03
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2			0.2		0.1
Control Delay (s/veh)		8.3				8.6					14.3			24.4		11.0
Level of Service, LOS		A				A					B			C		B
Approach Delay (s/veh)	0.1				0.2				14.3				15.9			
Approach LOS									B				C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Project AM	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	1	0		0	1	1
Configuration		L		TR			LTR				LTR			LT		R
Volume, V (veh/h)		4	241	0		8	537	18		4	2	6		3	1	2
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

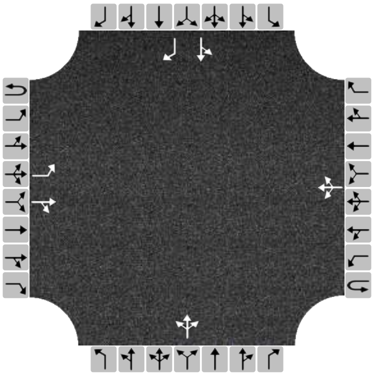
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		4				9					13			4		2
Capacity, c (veh/h)		957				1288					402			255		494
v/c Ratio		0.00				0.01					0.03			0.02		0.00
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.1			0.0		0.0
Control Delay (s/veh)		8.8				7.8					14.3			19.4		12.3
Level of Service, LOS		A				A					B			C		B
Approach Delay (s/veh)	0.1				0.2				14.3				17.0			
Approach LOS									B				C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	MS	Intersection	Oak @ City Hall
Agency/Co.	Wolverton	Jurisdiction	City of Snellville
Date Performed	11/5/2019	East/West Street	Oak Rd
Analysis Year	2023	North/South Street	City Hall Dr
Time Analyzed	Project PM	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	19-LD-006 Snellville Town Center		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	1	0		0	1	1
Configuration		L		TR			LTR				LTR			LT		R
Volume, V (veh/h)		9	636	2		8	496	22		4	0	21		12	0	19
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized	No				No				No				No			
Median Type/Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		9				8					26			12		20
Capacity, c (veh/h)		1028				924					348			145		552
v/c Ratio		0.01				0.01					0.07			0.08		0.04
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2			0.3		0.1
Control Delay (s/veh)		8.5				8.9					16.2			32.0		11.8
Level of Service, LOS		A				A					C			D		B
Approach Delay (s/veh)	0.1				0.2				16.2				19.3			
Approach LOS									C				C			

15: Oak Rd & US 78

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	31	499	9	251	1342	117	49	369	387	96	111
v/c Ratio	0.18	0.27	0.01	0.48	0.68	0.13	0.16	0.85	0.65	0.30	0.19
Control Delay	17.2	25.0	0.0	12.2	13.2	1.7	55.5	84.1	20.2	44.4	44.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	25.0	0.0	12.2	13.2	1.7	55.5	84.1	20.2	44.4	44.5
Queue Length 50th (ft)	15	176	0	54	153	3	46	411	95	40	93
Queue Length 95th (ft)	31	220	0	m78	193	m8	87	#558	224	63	147
Internal Link Dist (ft)		1337			1165			969			549
Turn Bay Length (ft)	150		95	175		125	140			260	
Base Capacity (vph)	180	1846	869	521	1980	926	303	442	599	451	621
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.27	0.01	0.48	0.68	0.13	0.16	0.83	0.65	0.21	0.18

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
15: Oak Rd & US 78

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰↰	↑↱	
Traffic Volume (veh/h)	29	474	9	238	1275	111	47	351	368	91	101	5
Future Volume (veh/h)	29	474	9	238	1275	111	47	351	368	91	101	5
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	31	499	9	251	1342	117	49	369	0	96	106	5
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	203	1770	792	630	2144	959	307	389	330	221	482	23
Arrive On Green	0.02	0.50	0.50	0.12	0.61	0.61	0.21	0.21	0.00	0.03	0.27	0.27
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1277	1863	1583	3442	1765	83
Grp Volume(v), veh/h	31	499	9	251	1342	117	49	369	0	96	0	111
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1277	1863	1583	1721	0	1848
Q Serve(g_s), s	1.2	14.8	0.4	0.0	43.3	5.7	5.7	35.2	0.0	3.9	0.0	8.4
Cycle Q Clear(g_c), s	1.2	14.8	0.4	0.0	43.3	5.7	5.7	35.2	0.0	3.9	0.0	8.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	203	1770	792	630	2144	959	307	389	330	221	0	505
V/C Ratio(X)	0.15	0.28	0.01	0.40	0.63	0.12	0.16	0.95	0.00	0.43	0.00	0.22
Avail Cap(c_a), veh/h	241	1770	792	630	2144	959	312	397	338	420	0	620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.50	0.50	0.50	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.7	26.2	14.6	26.4	22.5	15.1	58.6	70.3	0.0	56.8	0.0	50.6
Incr Delay (d2), s/veh	0.3	0.4	0.0	0.2	0.7	0.1	0.2	32.0	0.0	1.3	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	7.3	0.2	8.0	21.3	2.5	2.0	21.6	0.0	1.9	0.0	4.3
LnGrp Delay(d),s/veh	19.0	26.6	14.7	26.6	23.2	15.2	58.8	102.2	0.0	58.1	0.0	50.8
LnGrp LOS	B	C	B	C	C	B	E	F		E		D
Approach Vol, veh/h		539			1710			418			207	
Approach Delay, s/veh		26.0			23.2			97.2			54.2	
Approach LOS		C			C			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	115.0		55.8	28.2	96.0	11.6	44.2
Change Period (Y+Rc), s	6.0	6.0		* 6.6	6.0	* 6	5.6	* 6.6
Max Green Setting (Gmax), s	7.0	94.0		* 60	11.1	* 90	16.4	* 38
Max Q Clear Time (g_c+I1), s	3.2	45.3		10.4	2.0	16.8	5.9	37.2
Green Ext Time (p_c), s	0.0	16.4		3.3	5.3	3.7	0.2	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	36.7
HCM 2010 LOS	D

Notes

Queues
15: Oak Rd & US 78

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	25	1031	10	282	751	136	34	296	584	250	353
v/c Ratio	0.07	0.58	0.01	1.03	0.39	0.15	0.16	0.71	1.18	0.49	0.57
Control Delay	16.4	33.4	0.0	104.1	12.9	2.4	59.7	75.3	139.8	45.9	53.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	33.4	0.0	104.1	12.9	2.4	59.7	75.3	139.8	45.9	53.1
Queue Length 50th (ft)	12	446	0	~158	107	2	33	328	~654	108	342
Queue Length 95th (ft)	27	516	0	#268	123	m12	70	451	#920	146	456
Internal Link Dist (ft)		1337			1165			969			549
Turn Bay Length (ft)	150		95	175		125	140			260	
Base Capacity (vph)	369	1769	837	273	1950	913	215	418	494	545	621
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.58	0.01	1.03	0.39	0.15	0.16	0.71	1.18	0.46	0.57

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰↰	↱	
Traffic Volume (veh/h)	24	990	10	271	721	131	33	284	561	240	322	17
Future Volume (veh/h)	24	990	10	271	721	131	33	284	561	240	322	17
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	25	1031	10	282	751	136	34	296	0	250	335	18
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	2	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	448	1956	875	348	1848	827	156	336	286	379	496	27
Arrive On Green	0.09	0.55	0.55	0.06	0.52	0.52	0.18	0.18	0.00	0.07	0.28	0.28
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1024	1863	1583	3442	1752	94
Grp Volume(v), veh/h	25	1031	10	282	751	136	34	296	0	250	0	353
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1024	1863	1583	1721	0	1846
Q Serve(g_s), s	0.0	33.1	0.5	11.1	23.2	8.1	5.5	27.9	0.0	10.5	0.0	30.5
Cycle Q Clear(g_c), s	0.0	33.1	0.5	11.1	23.2	8.1	17.6	27.9	0.0	10.5	0.0	30.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	448	1956	875	348	1848	827	156	336	286	379	0	522
V/C Ratio(X)	0.06	0.53	0.01	0.81	0.41	0.16	0.22	0.88	0.00	0.66	0.00	0.68
Avail Cap(c_a), veh/h	448	1956	875	348	1848	827	190	397	338	447	0	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.80	0.80	0.80	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.9	25.4	18.1	26.7	26.1	22.5	73.2	71.9	0.0	56.8	0.0	57.2
Incr Delay (d2), s/veh	0.1	1.0	0.0	11.0	0.5	0.3	0.7	17.8	0.0	2.8	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	16.5	0.2	8.1	11.4	3.6	1.6	16.1	0.0	5.1	0.0	15.9
LnGrp Delay(d),s/veh	24.9	26.4	18.1	37.6	26.6	22.8	73.9	89.7	0.0	59.6	0.0	59.5
LnGrp LOS	C	C	B	D	C	C	E	F		E		E
Approach Vol, veh/h		1066			1169			330			603	
Approach Delay, s/veh		26.3			28.8			88.1			59.6	
Approach LOS		C			C			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.5	100.0		57.5	17.0	105.5	18.4	39.1
Change Period (Y+Rc), s	6.0	6.0		* 6.6	5.9	6.0	5.6	* 6.6
Max Green Setting (Gmax), s	7.0	94.0		* 60	11.1	90.0	16.4	* 38
Max Q Clear Time (g_c+I1), s	2.0	25.2		32.5	13.1	35.1	12.5	29.9
Green Ext Time (p_c), s	2.9	6.6		4.3	0.0	9.5	0.3	2.6

Intersection Summary			
HCM 2010 Ctrl Delay			40.0
HCM 2010 LOS			D

Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	33	540	11	272	1453	126	54	400	419	104	120
v/c Ratio	0.24	0.30	0.01	0.57	0.76	0.14	0.17	0.86	0.68	0.33	0.19
Control Delay	19.3	26.9	0.0	14.0	15.0	2.4	54.9	82.3	23.7	43.4	43.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	26.9	0.0	14.0	15.0	2.4	54.9	82.3	23.7	43.4	43.4
Queue Length 50th (ft)	16	195	0	59	166	4	50	454	136	43	100
Queue Length 95th (ft)	33	240	0	m82	222	m9	95	#653	277	68	157
Internal Link Dist (ft)		1337			1165			969			549
Turn Bay Length (ft)	150		95	175		125	140			260	
Base Capacity (vph)	144	1778	841	479	1911	897	317	467	616	450	622
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.30	0.01	0.57	0.76	0.14	0.17	0.86	0.68	0.23	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰↰	↱	
Traffic Volume (veh/h)	31	513	10	258	1380	120	51	380	398	99	109	5
Future Volume (veh/h)	31	513	10	258	1380	120	51	380	398	99	109	5
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	33	540	11	272	1453	126	54	400	0	104	115	5
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	175	1770	792	597	2120	948	310	397	338	202	496	22
Arrive On Green	0.02	0.50	0.50	0.12	0.60	0.60	0.21	0.21	0.00	0.04	0.28	0.28
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1266	1863	1583	3442	1772	77
Grp Volume(v), veh/h	33	540	11	272	1453	126	54	400	0	104	0	120
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1266	1863	1583	1721	0	1849
Q Serve(g_s), s	1.3	16.2	0.5	0.0	50.3	6.2	6.3	38.4	0.0	4.2	0.0	9.0
Cycle Q Clear(g_c), s	1.3	16.2	0.5	0.0	50.3	6.2	6.3	38.4	0.0	4.2	0.0	9.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	175	1770	792	597	2120	948	310	397	338	202	0	517
V/C Ratio(X)	0.19	0.31	0.01	0.46	0.69	0.13	0.17	1.01	0.00	0.52	0.00	0.23
Avail Cap(c_a), veh/h	212	1770	792	597	2120	948	310	397	338	394	0	620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.3	26.6	14.5	29.6	24.6	15.7	58.2	70.8	0.0	56.5	0.0	49.9
Incr Delay (d2), s/veh	0.5	0.4	0.0	0.2	0.6	0.1	0.3	46.8	0.0	2.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	8.1	0.2	9.4	24.6	2.8	2.2	24.9	0.0	2.1	0.0	4.6
LnGrp Delay(d),s/veh	21.8	27.0	14.5	29.8	25.2	15.8	58.4	117.6	0.0	58.5	0.0	50.2
LnGrp LOS	C	C	B	C	C	B	E	F		E		D
Approach Vol, veh/h		584			1851			454			224	
Approach Delay, s/veh		26.5			25.2			110.6			54.0	
Approach LOS		C			C			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	113.8		57.0	27.0	96.0	12.0	45.0
Change Period (Y+Rc), s	6.0	6.0		* 6.6	6.0	* 6	5.6	* 6.6
Max Green Setting (Gmax), s	7.0	94.0		* 60	11.1	* 90	16.4	* 38
Max Q Clear Time (g_c+I1), s	3.3	52.3		11.0	2.0	18.2	6.2	40.4
Green Ext Time (p_c), s	0.0	17.9		3.6	5.4	4.1	0.2	0.0

Intersection Summary			
HCM 2010 Ctrl Delay			40.0
HCM 2010 LOS			D

Notes

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	27	1117	11	305	813	148	38	320	632	271	383
v/c Ratio	0.08	0.63	0.01	1.23	0.43	0.17	0.20	0.77	1.32	0.57	0.62
Control Delay	16.7	34.9	0.0	174.0	13.9	2.7	61.2	79.7	197.1	47.8	55.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.7	34.9	0.0	174.0	13.9	2.7	61.2	79.7	197.1	47.8	55.0
Queue Length 50th (ft)	13	501	0	~285	116	3	37	362	~813	118	379
Queue Length 95th (ft)	28	576	0	#357	132	m15	77	#509	#1075	158	501
Internal Link Dist (ft)		1337			1165			969			549
Turn Bay Length (ft)	150		95	175		125	140			260	
Base Capacity (vph)	335	1769	837	247	1899	892	192	413	477	501	622
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.63	0.01	1.23	0.43	0.17	0.20	0.77	1.32	0.54	0.62

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰↰	↱	
Traffic Volume (veh/h)	26	1072	11	293	780	142	36	307	607	260	349	18
Future Volume (veh/h)	26	1072	11	293	780	142	36	307	607	260	349	18
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	27	1117	11	305	812	148	38	320	0	271	364	19
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	2	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	397	1903	851	311	1848	827	154	357	303	388	523	27
Arrive On Green	0.08	0.54	0.54	0.06	0.52	0.52	0.19	0.19	0.00	0.08	0.30	0.30
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	996	1863	1583	3442	1755	92
Grp Volume(v), veh/h	27	1117	11	305	812	148	38	320	0	271	0	383
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	996	1863	1583	1721	0	1847
Q Serve(g_s), s	0.0	38.4	0.6	11.1	25.6	8.9	6.3	30.2	0.0	11.3	0.0	33.1
Cycle Q Clear(g_c), s	0.0	38.4	0.6	11.1	25.6	8.9	20.2	30.2	0.0	11.3	0.0	33.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	397	1903	851	311	1848	827	154	357	303	388	0	550
V/C Ratio(X)	0.07	0.59	0.01	0.98	0.44	0.18	0.25	0.90	0.00	0.70	0.00	0.70
Avail Cap(c_a), veh/h	397	1903	851	311	1848	827	176	397	338	442	0	620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.74	0.74	0.74	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.9	28.1	19.4	37.9	26.7	22.7	73.4	71.0	0.0	55.4	0.0	56.0
Incr Delay (d2), s/veh	0.1	1.3	0.0	39.1	0.6	0.4	0.8	21.0	0.0	4.1	0.0	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	19.1	0.3	13.1	12.7	3.9	1.8	17.6	0.0	5.6	0.0	17.4
LnGrp Delay(d),s/veh	28.0	29.5	19.4	77.0	27.2	23.0	74.2	92.0	0.0	59.5	0.0	58.9
LnGrp LOS	C	C	B	E	C	C	E	F		E		E
Approach Vol, veh/h		1155			1265			358			654	
Approach Delay, s/veh		29.3			38.7			90.2			59.2	
Approach LOS		C			D			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.8	100.0		60.2	17.0	102.8	19.2	41.1
Change Period (Y+Rc), s	6.0	6.0		* 6.6	5.9	6.0	5.6	* 6.6
Max Green Setting (Gmax), s	7.0	94.0		* 60	11.1	90.0	16.4	* 38
Max Q Clear Time (g_c+I1), s	2.0	27.6		35.1	13.1	40.4	13.3	32.2
Green Ext Time (p_c), s	3.1	7.4		4.6	0.0	10.7	0.3	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	44.8
HCM 2010 LOS	D

Notes

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	40	544	11	272	1457	133	54	402	419	111	133
v/c Ratio	0.29	0.31	0.01	0.57	0.76	0.15	0.17	0.86	0.68	0.35	0.22
Control Delay	20.7	27.1	0.0	14.1	15.2	2.7	55.2	82.8	24.2	43.7	42.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	27.1	0.0	14.1	15.2	2.7	55.2	82.8	24.2	43.7	42.7
Queue Length 50th (ft)	19	197	0	59	168	5	50	458	139	46	110
Queue Length 95th (ft)	38	242	0	m82	224	m10	96	#665	281	72	169
Internal Link Dist (ft)		1337			1165			969			549
Turn Bay Length (ft)	150		95	175		125	140			260	
Base Capacity (vph)	141	1774	839	475	1906	894	313	467	615	449	617
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.31	0.01	0.57	0.76	0.15	0.17	0.86	0.68	0.25	0.22

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰↰	↑↱	
Traffic Volume (veh/h)	38	517	10	258	1384	126	51	382	398	105	112	14
Future Volume (veh/h)	38	517	10	258	1384	126	51	382	398	105	112	14
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	40	544	11	272	1457	133	54	402	0	111	118	15
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1770	792	592	2109	944	307	397	338	207	456	58
Arrive On Green	0.02	0.50	0.50	0.12	0.60	0.60	0.21	0.21	0.00	0.04	0.28	0.28
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1252	1863	1583	3442	1620	206
Grp Volume(v), veh/h	40	544	11	272	1457	133	54	402	0	111	0	133
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1252	1863	1583	1721	0	1826
Q Serve(g_s), s	1.6	16.3	0.5	0.0	50.9	6.7	6.4	38.4	0.0	4.5	0.0	10.2
Cycle Q Clear(g_c), s	1.6	16.3	0.5	0.0	50.9	6.7	6.4	38.4	0.0	4.5	0.0	10.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	174	1770	792	592	2109	944	307	397	338	207	0	514
V/C Ratio(X)	0.23	0.31	0.01	0.46	0.69	0.14	0.18	1.01	0.00	0.54	0.00	0.26
Avail Cap(c_a), veh/h	209	1770	792	592	2109	944	307	397	338	394	0	613
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.31	0.31	0.31	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.9	26.6	14.4	29.9	25.0	16.0	58.2	70.8	0.0	56.4	0.0	50.1
Incr Delay (d2), s/veh	0.7	0.5	0.0	0.2	0.6	0.1	0.3	48.1	0.0	2.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	8.1	0.2	9.5	25.1	2.9	2.2	25.1	0.0	2.2	0.0	5.2
LnGrp Delay(d),s/veh	22.5	27.0	14.4	30.1	25.6	16.1	58.5	118.9	0.0	58.5	0.0	50.4
LnGrp LOS	C	C	B	C	C	B	E	F		E		D
Approach Vol, veh/h		595			1862			456			244	
Approach Delay, s/veh		26.5			25.6			111.8			54.1	
Approach LOS		C			C			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	113.3		57.3	26.7	96.0	12.3	45.0
Change Period (Y+Rc), s	6.0	6.0		* 6.6	6.0	* 6	5.6	* 6.6
Max Green Setting (Gmax), s	7.0	94.0		* 60	11.1	* 90	16.4	* 38
Max Q Clear Time (g_c+I1), s	3.6	52.9		12.2	2.0	18.3	6.5	40.4
Green Ext Time (p_c), s	0.0	17.9		3.7	5.6	4.1	0.2	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.4
HCM 2010 LOS	D

Notes

Queues
15: Oak Rd & US 78

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	51	1128	11	305	824	167	38	328	632	288	412
v/c Ratio	0.16	0.64	0.01	1.25	0.43	0.19	0.22	0.80	1.34	0.62	0.67
Control Delay	18.2	35.1	0.0	179.4	13.9	3.0	62.7	82.2	204.3	49.2	57.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	35.1	0.0	179.4	13.9	3.0	62.7	82.2	204.3	49.2	57.1
Queue Length 50th (ft)	24	508	0	~290	121	4	38	375	~827	126	416
Queue Length 95th (ft)	46	584	0	#364	136	m18	78	#529	#1083	168	546
Internal Link Dist (ft)		1337			1165			969			549
Turn Bay Length (ft)	150		95	175		125	140			260	
Base Capacity (vph)	331	1769	837	244	1899	894	169	409	471	485	617
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.64	0.01	1.25	0.43	0.19	0.22	0.80	1.34	0.59	0.67

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
15: Oak Rd & US 78

Snellville Town Center
2023 Project PM

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰↰	↱	
Traffic Volume (veh/h)	49	1083	11	293	791	160	36	315	607	276	355	40
Future Volume (veh/h)	49	1083	11	293	791	160	36	315	607	276	355	40
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	51	1128	11	305	824	167	38	328	0	288	370	42
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	2	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	376	1877	840	302	1848	827	140	364	309	398	501	57
Arrive On Green	0.07	0.53	0.53	0.06	0.52	0.52	0.20	0.20	0.00	0.08	0.31	0.31
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	970	1863	1583	3442	1643	187
Grp Volume(v), veh/h	51	1128	11	305	824	167	38	328	0	288	0	412
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	970	1863	1583	1721	0	1830
Q Serve(g_s), s	0.0	39.5	0.6	11.1	26.1	10.1	6.6	31.0	0.0	11.9	0.0	36.3
Cycle Q Clear(g_c), s	0.0	39.5	0.6	11.1	26.1	10.1	23.1	31.0	0.0	11.9	0.0	36.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	376	1877	840	302	1848	827	140	364	309	398	0	558
V/C Ratio(X)	0.14	0.60	0.01	1.01	0.45	0.20	0.27	0.90	0.00	0.72	0.00	0.74
Avail Cap(c_a), veh/h	376	1877	840	302	1848	827	158	397	338	441	0	614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.72	0.72	0.72	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.3	29.1	20.0	39.3	26.8	23.0	75.3	70.7	0.0	54.9	0.0	56.1
Incr Delay (d2), s/veh	0.2	1.4	0.0	46.3	0.6	0.4	1.0	22.0	0.0	5.2	0.0	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	19.6	0.3	13.5	12.8	4.5	1.8	18.2	0.0	5.9	0.0	19.1
LnGrp Delay(d),s/veh	30.5	30.6	20.0	85.7	27.3	23.4	76.4	92.8	0.0	60.0	0.0	60.3
LnGrp LOS	C	C	C	F	C	C	E	F		E		E
Approach Vol, veh/h		1190			1296			366			700	
Approach Delay, s/veh		30.5			40.6			91.1			60.2	
Approach LOS		C			D			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.5	100.0		61.5	17.0	101.5	19.8	41.7
Change Period (Y+Rc), s	6.0	6.0		* 6.6	5.9	6.0	5.6	* 6.6
Max Green Setting (Gmax), s	7.0	94.0		* 60	11.1	90.0	16.4	* 38
Max Q Clear Time (g_c+I1), s	2.0	28.1		38.3	13.1	41.5	13.9	33.0
Green Ext Time (p_c), s	3.2	7.6		4.8	0.0	10.9	0.2	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	46.3
HCM 2010 LOS	D

Notes

	↗	→	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	132	799	14	1503	356	178	273	195	134
v/c Ratio	0.64	0.37	0.04	0.81	0.39	0.71	0.83	1.01	0.45
Control Delay	53.9	13.0	13.5	40.7	13.1	97.7	91.9	147.1	62.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.9	13.0	13.5	40.7	13.1	97.7	91.9	147.1	62.1
Queue Length 50th (ft)	80	150	6	783	113	107	314	~121	126
Queue Length 95th (ft)	#202	268	18	913	200	153	406	#215	190
Internal Link Dist (ft)		1165		894			851		881
Turn Bay Length (ft)	175		115		240	270		250	
Base Capacity (vph)	207	2152	421	1855	919	265	439	194	399
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	0.64	0.37	0.03	0.81	0.39	0.67	0.62	1.01	0.34

Intersection Summary

~ 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.

16: Wisteria Dr & US 78

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰↰	↱		↰↰	↱	
Traffic Volume (veh/h)	128	724	51	14	1458	345	173	250	15	189	77	53
Future Volume (veh/h)	128	724	51	14	1458	345	173	250	15	189	77	53
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	132	746	53	14	1503	356	178	258	15	195	79	0
Adj No. of Lanes	1	2	0	1	2	1	2	1	0	2	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	1795	127	333	1756	786	217	288	17	195	303	0
Arrive On Green	0.05	0.54	0.54	0.01	0.50	0.50	0.06	0.17	0.17	0.06	0.16	0.00
Sat Flow, veh/h	1774	3352	238	1774	3539	1583	3442	1743	101	3442	1863	0
Grp Volume(v), veh/h	132	394	405	14	1503	356	178	0	273	195	79	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1821	1774	1770	1583	1721	0	1845	1721	1863	0
Q Serve(g_s), s	6.6	23.9	23.9	0.6	66.9	26.3	9.2	0.0	26.1	10.2	6.7	0.0
Cycle Q Clear(g_c), s	6.6	23.9	23.9	0.6	66.9	26.3	9.2	0.0	26.1	10.2	6.7	0.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.05	1.00		0.00
Lane Grp Cap(c), veh/h	155	948	975	333	1756	786	217	0	305	195	303	0
V/C Ratio(X)	0.85	0.42	0.42	0.04	0.86	0.45	0.82	0.00	0.90	1.00	0.26	0.00
Avail Cap(c_a), veh/h	159	948	975	406	1756	786	266	0	438	195	411	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.89	0.89	0.89	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	39.8	25.0	25.0	20.3	39.7	29.5	83.3	0.0	73.6	84.9	65.9	0.0
Incr Delay (d2), s/veh	29.6	1.2	1.2	0.1	5.6	1.9	15.5	0.0	15.5	64.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	12.0	12.4	0.3	33.9	12.0	4.8	0.0	14.7	6.6	3.5	0.0
LnGrp Delay(d),s/veh	69.4	26.2	26.1	20.3	45.3	31.4	98.8	0.0	89.1	149.3	66.3	0.0
LnGrp LOS	E	C	C	C	D	C	F		F	F	E	
Approach Vol, veh/h		931			1873			451			274	
Approach Delay, s/veh		32.3			42.5			92.9			125.4	
Approach LOS		C			D			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	96.0	19.4	36.6	7.5	103.1	19.0	37.1				
Change Period (Y+Rc), s	6.0	* 6.7	* 8.1	7.3	5.5	* 6.7	8.8	7.3				
Max Green Setting (Gmax), s	9.0	* 89	* 14	39.7	9.5	* 89	10.2	42.7				
Max Q Clear Time (g_c+I1), s	8.6	68.9	11.2	8.7	2.6	25.9	12.2	28.1				
Green Ext Time (p_c), s	0.0	16.5	0.1	2.1	0.0	37.1	0.0	1.7				
Intersection Summary												
HCM 2010 Ctrl Delay			52.7									
HCM 2010 LOS			D									
Notes												

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	86	1726	27	982	262	131	256	489	365
v/c Ratio	0.31	0.92	0.25	0.55	0.29	0.66	0.81	1.27	0.86
Control Delay	15.1	33.2	23.3	33.5	9.0	99.1	87.9	199.9	84.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	33.2	23.3	33.5	9.0	99.1	87.9	199.9	84.6
Queue Length 50th (ft)	29	656	13	414	44	79	289	~373	415
Queue Length 95th (ft)	m50	m#1137	33	552	120	120	374	#496	510
Internal Link Dist (ft)		1165		894			851		881
Turn Bay Length (ft)	175		115		240	270		250	
Base Capacity (vph)	287	1866	109	1782	891	207	433	385	536
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	0.30	0.92	0.25	0.55	0.29	0.63	0.59	1.27	0.68

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰↰	↱		↰↰	↱	
Traffic Volume (veh/h)	84	1564	127	26	962	257	128	202	49	479	304	54
Future Volume (veh/h)	84	1564	127	26	962	257	128	202	49	479	304	54
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	86	1596	130	27	982	262	131	206	50	489	310	0
Adj No. of Lanes	1	2	0	1	2	1	2	1	0	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	204	1523	123	69	1540	689	169	240	58	386	434	0
Arrive On Green	0.04	0.46	0.46	0.02	0.44	0.44	0.05	0.17	0.17	0.11	0.23	0.00
Sat Flow, veh/h	1774	3317	268	1774	3539	1583	3442	1449	352	3442	1863	0
Grp Volume(v), veh/h	86	845	881	27	982	262	131	0	256	489	310	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1815	1774	1770	1583	1721	0	1801	1721	1863	0
Q Serve(g_s), s	4.8	82.6	82.6	1.5	39.1	20.2	6.8	0.0	24.9	20.2	27.6	0.0
Cycle Q Clear(g_c), s	4.8	82.6	82.6	1.5	39.1	20.2	6.8	0.0	24.9	20.2	27.6	0.0
Prop In Lane	1.00		0.15	1.00		1.00	1.00		0.20	1.00		0.00
Lane Grp Cap(c), veh/h	204	812	833	69	1540	689	169	0	299	386	434	0
V/C Ratio(X)	0.42	1.04	1.06	0.39	0.64	0.38	0.78	0.00	0.86	1.27	0.71	0.00
Avail Cap(c_a), veh/h	236	812	833	104	1540	689	208	0	427	386	545	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.45	0.45	0.45	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	31.5	48.7	48.7	44.1	39.8	34.4	84.6	0.0	73.0	79.9	63.5	0.0
Incr Delay (d2), s/veh	0.6	32.5	37.7	3.5	2.0	1.6	13.6	0.0	11.4	138.9	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	47.7	50.2	0.8	19.5	9.1	3.5	0.0	13.3	17.1	14.6	0.0
LnGrp Delay(d),s/veh	32.2	81.2	86.4	47.7	41.8	36.0	98.2	0.0	84.4	218.8	66.8	0.0
LnGrp LOS	C	F	F	D	D	D	F		F	F	E	
Approach Vol, veh/h		1812			1271			387			799	
Approach Delay, s/veh		81.4			40.7			89.1			159.8	
Approach LOS		F			D			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	85.0	16.9	49.2	8.5	89.3	29.0	37.1
Change Period (Y+Rc), s	6.0	* 6.7	* 8.1	7.3	5.5	* 6.7	8.8	7.3
Max Green Setting (Gmax), s	10.0	* 78	* 11	52.7	6.5	* 82	20.2	42.7
Max Q Clear Time (g_c+I1), s	6.8	41.1	8.8	29.6	3.5	84.6	22.2	26.9
Green Ext Time (p_c), s	0.0	30.4	0.1	3.4	0.0	0.0	0.0	3.0

Intersection Summary	
HCM 2010 Ctrl Delay	84.7
HCM 2010 LOS	F

Notes

	↗	→	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	143	865	15	1627	385	193	295	211	145
v/c Ratio	0.71	0.42	0.04	0.91	0.43	0.76	0.85	1.09	0.46
Control Delay	70.4	14.6	14.3	49.6	15.2	100.4	91.6	164.1	61.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.4	14.6	14.3	49.6	15.2	100.4	91.6	164.1	61.8
Queue Length 50th (ft)	106	230	6	932	142	117	339	~143	137
Queue Length 95th (ft)	m#294	300	19	1050	230	#165	433	#237	204
Internal Link Dist (ft)		1165		894			851		881
Turn Bay Length (ft)	175		115		240	270		250	
Base Capacity (vph)	201	2067	380	1789	893	265	439	194	399
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	0.71	0.42	0.04	0.91	0.43	0.73	0.67	1.09	0.36

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰↰	↱		↰↰	↱	
Traffic Volume (veh/h)	139	784	55	15	1578	373	187	271	16	205	83	57
Future Volume (veh/h)	139	784	55	15	1578	373	187	271	16	205	83	57
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	143	808	57	15	1627	385	193	279	16	211	86	0
Adj No. of Lanes	1	2	0	1	2	1	2	1	0	2	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	143	1802	127	309	1756	786	231	309	18	195	318	0
Arrive On Green	0.05	0.54	0.54	0.01	0.50	0.50	0.07	0.18	0.18	0.06	0.17	0.00
Sat Flow, veh/h	1774	3354	237	1774	3539	1583	3442	1745	100	3442	1863	0
Grp Volume(v), veh/h	143	426	439	15	1627	385	193	0	295	211	86	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1821	1774	1770	1583	1721	0	1845	1721	1863	0
Q Serve(g_s), s	9.0	26.4	26.4	0.7	77.2	29.1	10.0	0.0	28.2	10.2	7.2	0.0
Cycle Q Clear(g_c), s	9.0	26.4	26.4	0.7	77.2	29.1	10.0	0.0	28.2	10.2	7.2	0.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.05	1.00		0.00
Lane Grp Cap(c), veh/h	143	951	978	309	1756	786	231	0	327	195	318	0
V/C Ratio(X)	1.00	0.45	0.45	0.05	0.93	0.49	0.84	0.00	0.90	1.08	0.27	0.00
Avail Cap(c_a), veh/h	143	951	978	382	1756	786	266	0	438	195	411	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	0.86	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	52.2	25.4	25.4	20.5	42.3	30.2	83.0	0.0	72.5	84.9	64.9	0.0
Incr Delay (d2), s/veh	70.0	1.3	1.3	0.1	9.9	2.2	18.1	0.0	17.7	87.9	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.9	13.3	13.6	0.3	40.2	13.2	5.3	0.0	16.0	7.2	3.8	0.0
LnGrp Delay(d),s/veh	122.2	26.7	26.7	20.5	52.2	32.4	101.1	0.0	90.3	172.8	65.4	0.0
LnGrp LOS	F	C	C	C	D	C	F		F	F	E	
Approach Vol, veh/h		1008			2027			488			297	
Approach Delay, s/veh		40.3			48.2			94.5			141.7	
Approach LOS		D			D			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	96.0	20.2	38.0	7.6	103.4	19.0	39.2
Change Period (Y+Rc), s	6.0	* 6.7	* 8.1	7.3	5.5	* 6.7	8.8	7.3
Max Green Setting (Gmax), s	9.0	* 89	* 14	39.7	9.5	* 89	10.2	42.7
Max Q Clear Time (g_c+I1), s	11.0	79.2	12.0	9.2	2.7	28.4	12.2	30.2
Green Ext Time (p_c), s	0.0	9.2	0.1	2.3	0.0	40.8	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	59.3
HCM 2010 LOS	E

Notes

Queues
16: Wisteria Dr & US 78

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	93	1868	29	1062	284	142	277	529	395
v/c Ratio	0.39	1.02	0.28	0.61	0.33	0.71	0.81	1.37	0.88
Control Delay	17.6	51.6	25.1	36.6	10.7	102.1	86.3	238.2	85.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	51.6	25.1	36.6	10.7	102.1	86.3	238.2	85.7
Queue Length 50th (ft)	36	~1246	14	481	60	86	311	~424	449
Queue Length 95th (ft)	m56	m#1204	35	613	142	128	401	#548	554
Internal Link Dist (ft)		1165		894			851		881
Turn Bay Length (ft)	175		115		240	270		250	
Base Capacity (vph)	251	1824	107	1734	873	207	433	385	536
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	0.37	1.02	0.27	0.61	0.33	0.69	0.64	1.37	0.74

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
16: Wisteria Dr & US 78

Snellville Town Center
2023 Background PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰↰	↱		↰↰	↱	
Traffic Volume (veh/h)	91	1693	137	28	1041	278	139	219	53	518	329	58
Future Volume (veh/h)	91	1693	137	28	1041	278	139	219	53	518	329	58
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	93	1728	140	29	1062	284	142	223	54	529	336	0
Adj No. of Lanes	1	2	0	1	2	1	2	1	0	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	1530	123	70	1540	689	180	258	62	386	450	0
Arrive On Green	0.04	0.46	0.46	0.02	0.44	0.44	0.05	0.18	0.18	0.11	0.24	0.00
Sat Flow, veh/h	1774	3320	266	1774	3539	1583	3442	1450	351	3442	1863	0
Grp Volume(v), veh/h	93	912	956	29	1062	284	142	0	277	529	336	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1816	1774	1770	1583	1721	0	1801	1721	1863	0
Q Serve(g_s), s	5.2	82.9	82.9	1.6	43.6	22.2	7.3	0.0	26.9	20.2	30.0	0.0
Cycle Q Clear(g_c), s	5.2	82.9	82.9	1.6	43.6	22.2	7.3	0.0	26.9	20.2	30.0	0.0
Prop In Lane	1.00		0.15	1.00		1.00	1.00		0.19	1.00		0.00
Lane Grp Cap(c), veh/h	189	815	837	70	1540	689	180	0	320	386	450	0
V/C Ratio(X)	0.49	1.12	1.14	0.41	0.69	0.41	0.79	0.00	0.87	1.37	0.75	0.00
Avail Cap(c_a), veh/h	216	815	837	104	1540	689	208	0	427	386	545	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.27	0.27	0.27	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.0	48.5	48.5	44.1	41.0	35.0	84.3	0.0	71.9	79.9	63.2	0.0
Incr Delay (d2), s/veh	0.5	58.4	68.5	3.8	2.6	1.8	16.2	0.0	13.4	182.1	4.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	53.8	57.5	0.8	21.8	10.1	3.9	0.0	14.6	19.4	16.1	0.0
LnGrp Delay(d),s/veh	33.6	106.9	117.1	47.9	43.6	36.8	100.5	0.0	85.3	262.0	67.7	0.0
LnGrp LOS	C	F	F	D	D	D	F		F	F	E	
Approach Vol, veh/h		1961			1375			419			865	
Approach Delay, s/veh		108.4			42.3			90.4			186.5	
Approach LOS		F			D			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.2	85.0	17.5	50.8	8.6	89.6	29.0	39.3
Change Period (Y+Rc), s	6.0	* 6.7	* 8.1	7.3	5.5	* 6.7	8.8	7.3
Max Green Setting (Gmax), s	10.0	* 78	* 11	52.7	6.5	* 82	20.2	42.7
Max Q Clear Time (g_c+I1), s	7.2	45.6	9.3	32.0	3.6	84.9	22.2	28.9
Green Ext Time (p_c), s	0.0	28.8	0.1	3.6	0.0	0.0	0.0	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	101.7
HCM 2010 LOS	F

Notes

Queues
16: Wisteria Dr & US 78

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	146	871	15	1633	398	193	295	226	150
v/c Ratio	0.71	0.42	0.04	0.92	0.45	0.76	0.85	1.16	0.47
Control Delay	70.1	14.6	14.4	50.7	15.5	100.4	91.6	184.7	62.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.1	14.6	14.4	50.7	15.5	100.4	91.6	184.7	62.1
Queue Length 50th (ft)	108	234	6	938	149	117	339	~162	142
Queue Length 95th (ft)	m#302	304	19	1056	241	#165	433	#259	209
Internal Link Dist (ft)		1165		894			851		881
Turn Bay Length (ft)	175		115		240	270		250	
Base Capacity (vph)	206	2067	377	1780	893	265	439	194	399
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	0.71	0.42	0.04	0.92	0.45	0.73	0.67	1.16	0.38

Intersection Summary

~ 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.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
16: Wisteria Dr & US 78

Snellville Town Center
2023 Project AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰↰	↱		↰↰	↱	
Traffic Volume (veh/h)	142	790	55	15	1584	386	187	271	16	219	83	62
Future Volume (veh/h)	142	790	55	15	1584	386	187	271	16	219	83	62
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	146	814	57	15	1633	398	193	279	16	226	86	0
Adj No. of Lanes	1	2	0	1	2	1	2	1	0	2	1	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	142	1803	126	307	1756	786	231	309	18	195	318	0
Arrive On Green	0.05	0.54	0.54	0.01	0.50	0.50	0.07	0.18	0.18	0.06	0.17	0.00
Sat Flow, veh/h	1774	3356	235	1774	3539	1583	3442	1745	100	3442	1863	0
Grp Volume(v), veh/h	146	429	442	15	1633	398	193	0	295	226	86	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1821	1774	1770	1583	1721	0	1845	1721	1863	0
Q Serve(g_s), s	9.0	26.7	26.7	0.7	77.7	30.5	10.0	0.0	28.2	10.2	7.2	0.0
Cycle Q Clear(g_c), s	9.0	26.7	26.7	0.7	77.7	30.5	10.0	0.0	28.2	10.2	7.2	0.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.05	1.00		0.00
Lane Grp Cap(c), veh/h	142	951	978	307	1756	786	231	0	327	195	318	0
V/C Ratio(X)	1.03	0.45	0.45	0.05	0.93	0.51	0.84	0.00	0.90	1.16	0.27	0.00
Avail Cap(c_a), veh/h	142	951	978	380	1756	786	266	0	438	195	411	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	0.86	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	52.6	25.5	25.5	20.5	42.4	30.5	83.0	0.0	72.5	84.9	64.9	0.0
Incr Delay (d2), s/veh	77.4	1.3	1.3	0.1	10.3	2.3	18.1	0.0	17.7	113.8	0.5	0.0
Initial Q Delay(d3),s/veh	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	13.3	13.7	0.3	40.4	13.9	5.3	0.0	16.0	7.9	3.8	0.0
LnGrp Delay(d),s/veh	130.3	26.8	26.8	20.6	52.7	32.9	101.1	0.0	90.3	198.7	65.4	0.0
LnGrp LOS	F	C	C	C	D	C	F		F	F	E	
Approach Vol, veh/h		1017			2046			488			312	
Approach Delay, s/veh		41.6			48.6			94.5			161.9	
Approach LOS		D			D			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	96.0	20.2	38.0	7.6	103.4	19.0	39.2
Change Period (Y+Rc), s	6.0	* 6.7	* 8.1	7.3	5.5	* 6.7	8.8	7.3
Max Green Setting (Gmax), s	9.0	* 89	* 14	39.7	9.5	* 89	10.2	42.7
Max Q Clear Time (g_c+I1), s	11.0	79.7	12.0	9.2	2.7	28.7	12.2	30.2
Green Ext Time (p_c), s	0.0	8.8	0.1	2.3	0.0	41.1	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	61.7
HCM 2010 LOS	E

Notes

	↗	→	↙	←	↖	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	1885	29	1081	324	142	277	567	406
v/c Ratio	0.45	1.04	0.28	0.63	0.37	0.71	0.79	1.47	0.89
Control Delay	18.4	57.3	25.3	37.9	11.5	102.1	83.9	276.3	86.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	57.3	25.3	37.9	11.5	102.1	83.9	276.3	86.8
Queue Length 50th (ft)	43	~1283	15	504	74	86	308	~471	460
Queue Length 95th (ft)	m64	m#1196	35	627	164	128	401	#598	573
Internal Link Dist (ft)		1165		894			851		881
Turn Bay Length (ft)	175		115		240	270		250	
Base Capacity (vph)	242	1810	108	1711	875	207	433	385	535
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	0.43	1.04	0.27	0.63	0.37	0.69	0.64	1.47	0.76

Intersection Summary

~ 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.
m Volume for 95th percentile queue is metered by upstream signal.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↑	↱	↰↰	↱		↰↰	↱	
Traffic Volume (veh/h)	103	1710	137	28	1059	318	139	219	53	556	329	69
Future Volume (veh/h)	103	1710	137	28	1059	318	139	219	53	556	329	69
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	105	1745	140	29	1081	324	142	223	54	567	336	0
Adj No. of Lanes	1	2	0	1	2	1	2	1	0	2	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	1544	122	70	1540	689	180	258	62	386	450	0
Arrive On Green	0.04	0.46	0.46	0.02	0.44	0.44	0.05	0.18	0.18	0.11	0.24	0.00
Sat Flow, veh/h	1774	3322	263	1774	3539	1583	3442	1450	351	3442	1863	0
Grp Volume(v), veh/h	105	920	965	29	1081	324	142	0	277	567	336	0
Grp Sat Flow(s),veh/h/ln	1774	1770	1816	1774	1770	1583	1721	0	1801	1721	1863	0
Q Serve(g_s), s	5.9	83.6	83.6	1.6	44.7	26.2	7.3	0.0	26.9	20.2	30.0	0.0
Cycle Q Clear(g_c), s	5.9	83.6	83.6	1.6	44.7	26.2	7.3	0.0	26.9	20.2	30.0	0.0
Prop In Lane	1.00		0.15	1.00		1.00	1.00		0.19	1.00		0.00
Lane Grp Cap(c), veh/h	189	822	844	70	1540	689	180	0	320	386	450	0
V/C Ratio(X)	0.56	1.12	1.14	0.41	0.70	0.47	0.79	0.00	0.87	1.47	0.75	0.00
Avail Cap(c_a), veh/h	210	822	844	104	1540	689	208	0	427	386	545	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.23	0.23	0.23	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.6	48.2	48.2	44.0	41.4	36.1	84.3	0.0	71.9	79.9	63.2	0.0
Incr Delay (d2), s/veh	0.6	57.7	68.3	3.8	2.7	2.3	16.2	0.0	13.4	224.3	4.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	54.1	58.0	0.8	22.3	11.8	3.9	0.0	14.6	21.6	16.1	0.0
LnGrp Delay(d),s/veh	34.2	105.9	116.5	47.9	44.1	38.4	100.5	0.0	85.3	304.2	67.7	0.0
LnGrp LOS	C	F	F	D	D	D	F		F	F	E	
Approach Vol, veh/h		1990			1434			419			903	
Approach Delay, s/veh		107.2			42.9			90.4			216.2	
Approach LOS		F			D			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.9	85.0	17.5	50.8	8.6	90.3	29.0	39.3
Change Period (Y+Rc), s	6.0	* 6.7	* 8.1	7.3	5.5	* 6.7	8.8	7.3
Max Green Setting (Gmax), s	10.0	* 78	* 11	52.7	6.5	* 82	20.2	42.7
Max Q Clear Time (g_c+I1), s	7.9	46.7	9.3	32.0	3.6	85.6	22.2	28.9
Green Ext Time (p_c), s	0.0	28.2	0.1	3.6	0.0	0.0	0.0	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	107.0
HCM 2010 LOS	F

Notes

EXHIBIT C

TOWN CENTER ROADWAY IMPROVEMENTS

(posted on city web site)

EXHIBIT D

Gwinnett County Plan Development Process
And
Plan Review Checklist

GWINNETT COUNTY
DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN PREPARATION GUIDELINES

BOARD OF COMMISSIONERS OF GWINNETT COUNTY
DECEMBER 15, 1818
GEORGIA

Director of Preconstruction

75 Langley Drive

Lawrenceville, GA 30046

770-822-7400

DOCUMENT REVISION RECORD

ROADWAY PLAN PREPARATION GUIDELINES	
DATE	**DESCRIPTION OF REVISION**
04/01/94	Original Issue
11/06/97	Complete Revision
01/03/2011	Revised
01/01/2014	Revised

TABLE OF CONTENTS

CHAPTER 1

PRODUCTION OF PLANS

Purpose

These criteria establish, define, and clarify procedures and standards to be used for Gwinnett County Department of Transportation (GCDOT) drawings. The intent of these criteria are as guidelines to assure that all drawings have a uniform appearance and include all pertinent information, avoid unnecessary information, and reflect high quality workmanship.

Engineers, technicians, and drafters are responsible for ensuring that these criteria are implemented accurately and on a timely basis and that the drawings show the information completely, clearly, and legibly without unnecessary embellishment.

Legibility Guidelines

Normally, all letters and figures should be readable from either the bottom or right edge of the sheet. The guide for reading is as follows:

1.	Horizontal Line:	Read left to right
2.	Vertical Line:	Read bottom to top
3.	Diagonals:	Read left to right

Abbreviations may be used when they save time and space, but must be clear and easily understood.

Any object which is drafted repeatedly should be symbolized. Symbols are necessary to reduce drafting time, increase legibility, and conserve space. Design Engineers shall utilize the Georgia Department of Transportation (GDOT) standard roadway construction and utility legend.

Bearings should be referenced to the nearest second, ground elevations to the nearest 1/10 (one decimal point), station pluses, distances and surface elevations on paved surfaces to the nearest 1/100 (two decimal points), and coordinates to the nearest 1/10000 (four decimal points).

For civil drawings, the decimal system shall be used for coordinate systems, elevations, gradients, points on horizontal and vertical alignments, survey information, inverts and slope designations. The feet-and-inches system shall be used for all other purposes.

For structural drawings, the decimal systems shall be used for specific elevations and the feet-and-inches system for all other layout dimensions and details.

The plans shall be fully dimensioned; all elevations necessary for construction shall be shown. Plans shall include a fully dimensioned geometric layout to permit staking in the field without additional computation by the survey party.

Availability

Examples of Plan Sheets may be made available to the design engineer. Files may be provided in AutoCad, DXF, or Microstation format, if available, by providing the County with blank CDs.

Base Sheet Format

All plan sheets are to be a nominal 24 inches by 36 inches. The border shall be 1 1/2 inch from the top and bottom edge, 1/2 inch from the right edge, and 2-1/2 inches from the left edge. The viewing area for all sheet formats shall be 21" x 33". All project drawings are subject to half size reduction to 12 inches by 18 inches.

Drafting medium for Project Drawings will be one of four standard formats:

Cover Sheet - Standard size with border and Gwinnett County logo only.

Plan Sheet - Standard size with border and title block and used for index, symbols, boring logs, plans, elevations, sections, and details.

Plan and Profile Sheet - Standard size with border and title block, and a profile grid on the lower half of the sheet. Profiles, however, will typically appear on standard cross section sheets.

Cross Section Sheet - Standard size with border and title block and 10 X 10 to-the-inch grid. Index lines shall be 0.50 mm and grid lines shall be plotted 0.35 mm. Cross section sheets are used for roadway profiles, driveway profiles, drainage profiles, and cross sections.

Title Block

All sheet formats shall have a standard title block 2" high running the full length of the bottom of the sheet. The title block shall provide for the listing of sheet revisions; date and initials of the designer, the checker, the drafter (CADD operator) and the submitting engineer; name and logo of the design consultant (if applicable), date and the sheet title.

Date

The submittal date to be shown on Conceptual, In-Progress Preliminary, Preliminary, Right-of-Way, and Final Plans shall be the submittal date. The date shall be shown thus: 12 JUN 90. The month shall be abbreviated by the first three letters.

Design Consultant

A blank block has been provided for use by the design consultant on the left side of the title block. This shall include the design consultant's logo, name, and business address.

Drawing Title

The drawing title shall be centered and include no more than three lines as follows:

Line 1 shall show the project name, as follows:

SUGARLOAF PARKWAY

Line 2 shall indicate the drawing group, such as

ROADWAY PLAN
GENERAL NOTES
SIGNING AND MARKING PLAN
DRAINAGE PROFILES

Line 3 shall be used to indicate in more detail what is shown on the drawing and where it is located. For example, Roadway Plan Drawings shall show the limiting stations.

Drawing Number

Use current GDOT standard drawing numbers.

These numbers are to be placed in small block in lower right hand corner of plan sheets.

I. Index Sheets in the following sequence:

1. Cover Sheet
2. Index
3. Revision Summary
4. General Notes
5. Typical Sections
6. Summary of Quantities
7. Quantities Required by Amendment (For Federal Aid Projects Only)
8. Quantities Required on Construction (For Federal Aid Projects Only)
9. Detailed Estimate
10. Traffic Diagrams (if needed)
11. Construction Layout
13. Mainline Plan
14. Crossroad Plan
RW. Right of Way Data Sheets (for small projects)
15. Mainline Profile
16. Crossroad Profile
17. Driveway Profile
18. Intersection Detail Plans or Special Grading (if needed)
19. Construction Staging Plans and Cross Sections

20. Construction Staging Details (if needed)
21. Drainage Area Map
22. Drainage Profiles and Cross Sections
23. Earthwork Cross Sections
24. Utility Sheets
25. Lighting Plans & Details
26. Signing and Marking Plans
27. Signal Plans
28. ATMS Plans
29. Landscaping Plans (if needed)
31. Retaining Wall Envelopes
35. Bridge Plans
37. Miscellaneous Structures
38. Special Construction Details
44. Utility Relocation Plans
50. Erosion Control Cover Sheet
51. ESPCP & Monitoring General Notes
52. Erosion Control Legends & Uniform Codes
53. Drainage Area Map
54. BMP Location Details
55. Watershed Map & Site Monitoring Location
56. Erosion Control Details

RW Right of Way Plans (if a separate set is required)

II. The total sheets in the index should be total number of sheets in the project. The total sheets in the upper right hand corner of each sheet should be the number of the last sheet in the plans.

Revisions

Revisions shall be shown reflecting the date of revision, a brief description of the revision, and the initials of the drafter. With the exception of right of way plan revisions, plan changes shall only be recorded as revisions after the project plans have been let to construction. Revisions shall also be included on the Revision Summary Sheet in greater detail.

Right of way plan changes shall be considered revisions after the initial right of way plans have been submitted to the County. All right of way plan revisions shall reflect the date of the revision, a brief description of the revision and the initials of the responsible engineer in the revision block on the affected sheets.

Reference Names

The first and middle initials and full last name shall be handwritten in ink by the appropriate person in the respective signature blocks identified by the words: Designed, Drawn, Checked, and Submitting Engineer. One person cannot serve as both designer and checker.

Project Number

A block shall be provided in the upper right corner to show the project number.

Sheet Number

The Sheet Number defines the drawing in consecutive numerical order in the set of project drawings. Final sheet numbers shall not normally be assigned until the time of the final submittal. The Cover Sheet shall be Page No. 1 in each set of project drawings. The sheet number shall be inked in the same location and manner as the project number.

Drawing Orientation

Drawings shall be oriented so that the stationing progresses from left to right across the sheet for projects running south to north and west to east. The North Arrow shall be displayed in the upper right corner of all plan drawings. Cross street stationing shall progress from left to right when looking ahead on mainline stationing.

All plan view drawings in a set shall be oriented in the same general direction. If separate drawings are required for cross street plans, drawings shall be oriented so that stationing progresses from left to right when looking ahead on mainline stationing. Match lines should be provided with reference to drawing number.

The set of project drawings shall be carefully organized so that the designer's intent can be easily read. Related ideas should be grouped together in an orderly arrangement. Each drawing shall be laid out with ample space between drawing items to ensure sufficient space for unanticipated details.

Scale of Drawings

All drawings shall be prepared on the scales listed below, unless otherwise approved by the County, but in any event, drawings and lettering shall be such as to produce clear and legible reproductions when reduced to half-size.

1. 1" = 10'
    - A. Preliminary layout for walls
    - B. Roadway Cross Sections - 1" = 10' horizontal and 1" = 10' vertical (1” = 5’V Preferred on sidewalk or other small projects)
    - C. Intersection Detail Sheets
    - D. Gore Detail Sheets
    - E. Staging Cross Sections
    - F. Drainage Profile
    - G. Wall Envelopes (1” = 20’horizontal may be used for long walls if prior approval is agreed to by GCDOT)
    - H. Preliminary layouts for bridges
    - I. Special Grading Plan

2. 1" = 20' *
    A. Mainline Plan
    B. Mainline Profile
    C. Ramp Plan
    D. Ramp Profile
    E. Existing roadways
    F. Staging Plans
    G. Cross Road Plan
    H. Right of Way Plan
    I. Cross Road Profile
    J. Utility Plan
    K. Signing and Marking Plan
    L. Utility Relocation Plan
    M. BMP Location Details

3. 1" = 200'
    A. Stakeout Sheet
    B. Detour Plan

*1” = 50’ is acceptable for new location projects provided plans are legible. Use of 50 scale must be approved by GCDOT prior to use.

A graphic scale shall be placed in the lower right hand corner of the plan sheet. The drawing scale shall be noted numerically, e.g., 1" = 100'. If more than one scale is used on a drawing, except Plan and Profile Sheets, the entry shall be "SCALE AS NOTED". If the drawing is not drawn to scale, the entry shall be "NO SCALE".

Lettering

General

All lettering shall be of sufficient weight and clarity that it can be easily read from a print that has been reduced to half scale of the original drawing. On any one sheet uniformity shall be maintained. Letter sizes and line widths shall be as specified herein. Shading should not be used as it darkens when reduced to half size and is difficult to read.

Lettering Orientation

All lettering shall read from the bottom or right edge of the sheet; in no case shall it be carried more than 15 degrees counterclockwise past vertical.

Dimensions

Dimensions shall be shown in only one location in the set of drawings and referred to from other drawings, if necessary, for clarity. Particular care shall be taken to avoid use of duplicate or unnecessary dimensions.

All dimension figures shall be placed about the dimension line when read from the bottom or the right edge of the sheet. For structural drawings, placement of dimensions outside the view is desirable. However, in the interest of clarity and simplicity, it may be necessary to place some dimensions within the view.

Linework

All linework shall be of sufficient clarity to be read easily from a print which has been reduced to half-size. Similar lines denoting an edge of pavement line, a dimension line, centerline, etc., shall have uniform widths whenever and wherever they are shown within a set of project drawings. Linework shall have appropriate gradations of width to give line contrast, e.g., between roadway centerline, edges of pavement, and dimensions. Arrow heads shall be solid.

Conflicts

All lettering and numbering must be kept clear of linework. Linework must not be drawn through text.

Submittals

GCDOT does not accept electronic (PDF, etc.) submissions as the official submissions of plan sets or revisions thereto. GCDOT only accepts hardcopies of plans as official submittals. All official submittals must be made to the attention of the project manager with a copy of the transmittal letter going to the Gwinnett County project manager.

All official plan submittals should include, at a minimum, 2 full size copies and 3 half size copies. In addition, at the preliminary, 90%, and final plan submittals, a PDF of the submittal along with the CAD files shall be submitted on a disk, or uploaded to the County’s FTP site. GCDOT reserves the right to request submission of in-progress plan sets in hard copy or electronic format.

CHAPTER 2

SEQUENCE OF PLANS PREPARATION

General

The construction plans and the specifications are the key documents on which the contractor bases his bid for a construction project. These documents are used in the construction of the project. It is imperative that the construction plans and specifications set forth the work to be done in a clear and concise manner to avoid misinterpretation.

The construction plans should be prepared systematically, to current AASHTO and Georgia Department of Transportation guidelines, undergoing various stages of review and revision to ensure technically correct and clear plans.

Proposed Typical Section

Typical sections show the design elements of a roadway in the form of cross sections. Pavement design data should be shown, if available. For some projects, typical sections are approved prior to the start of design; for others, typical sections are developed by the design engineer and submitted for approval.

Preliminary Geometrics

The design engineer sets the preliminary horizontal and vertical geometrics for a project and provides the production personnel with information to be produced on plans.

Horizontal geometrics consist of the roadway construction centerline and its bearings, curve data, angles at street intersections, pavement widths, taper lengths, left turn lanes, etc., and is plotted on the plan.

Vertical geometrics show the vertical curves and grades of the roadway along the profile grade line. The existing groundline along the construction centerline and the proposed profile grade line shall be plotted on the profile sheets.

Cross Sections

Information required for drafting existing cross sections is obtained from survey data. Proposed cross sections are compiled from typical sections and proposed vertical geometry. These templates are then superimposed at specified intervals on the existing cross sections to depict "cut" or "fill" along the project. Locations of existing utilities within construction limits may also be shown in the cross sections.

Plan Submittals and Reviews

Plan submittals shall be required as follows as a minimum:

- Concept
- In-Progress Preliminary (30% and/or 60% as requested)
- Preliminary Construction Plans
- Right-of-Way
- In-Progress Final (as requested)
- 90% Construction Plans
- Final Construction Plans (100% Complete)

Formal phase review with written comments will be performed for the following submittals:

- Preliminary Construction Plans
- Right-of-Way Plans
- 90% Construction Plans
- Final Construction Plans

Figure 2.1 summarizes the requirements for each submittal.

Phase submittal stages and numbers may vary for some projects. Prior to submitting the plans for a formal review, the design engineer shall conduct a Quality Assurance (Q.A.) review to ensure technically correct and complete plans. Design calculations shall be submitted with the plans for each formal phase review at the request of the County. The Drainage Report, Hydraulic Study, Bridge Scour Report, and Geotechnical Report shall be submitted with the preliminary plans submittal. Submittals will not be considered complete until the requested design calculations and/or reports are received by the County. The Q.A. is required for preliminary, right-of-way, 90% construction plans, and all final plan submittals. A construction cost estimate shall be included with each phase submittal. Leveling quantities will be submitted with 90% and Final Plans only.

The County will perform a formal checking of the design plans submitted for each formal phase review. The plans will be checked for completeness and conformance to current AASHTO and GDOT standards and criteria. The technical accuracy required for the design is the designer's responsibility. A "marked up" set of the plans shall be returned to the design engineer with comments for incorporation into the plans. The design engineer shall respond to the comments in writing (no exceptions).

Refer to Chapter 25, Quality Assurance, for specific information on the review process and plan requirements.

SUMMARY OF PLAN SUBMITTALS

No.	Plan Sheets	Prelim	Final
1.	Cover Sheet	P	F
2.	Index	P	F
3.	Revision Summary	P	F
4.	General Notes	P	F
5.	Typical Sections	P	F
6.	Summary of Quantities		F
7.	Quantities Required by Amendment (Federal Aid Projects Only)		F
8.	Quantities Required on Construction (Federal Aid Projects Only)		F
9.	Detailed Estimate		F
10.	Traffic Diagrams (if needed)	P	F
11.	Construction Layout	P	F
13.	Mainline Plan	P	F
14.	Crossroad Plan	P	F
15.	Mainline Profile	P	F
16.	Crossroad Profile	P	F
17.	Driveway Profile	P	F
18.	Intersection Detail Plans or Special Grading (if needed)	P	F
19.	Construction Staging and Cross Sections	P	F
20.	Construction Staging Details (if needed)	P	F
21.	Drainage Area Map	P	F
22.	Drainage Profiles and Cross Sections	P	F
23.	Earthwork Cross Sections	P	F
24.	Utility Sheets	P	F

25.	Lighting Plans & Details	P	F
26.	Signing and Marking Plans	P	F
27.	Signal Plans	P	F
28.	ATMS Plans		F
29.	Landscaping Plans (if needed)	P	F
31.	Retaining Wall Envelopes	P**	F
35.	Bridge Plans*	P	F
37.	Miscellaneous Structures	P	F
38.	Special Construction Details	P	F
44.	Utility Relocation Plans (must be approved by DWR)		F
50.	Erosion Control Cover Sheet	P	F
51.	ESPCP & Monitoring General Notes	P	F
52.	Erosion Control Legends & Uniform Codes	P	F
53.	Drainage Area Map	P	F
54.	BMP Location Details	P	F
55.	Watershed Map & Site Monitoring Location	P	F
56.	Erosion Control Details		F

P - Preliminary F - Final

*Preliminary bridge layout sheets required w/preliminary submittal.

**Preliminary wall envelopes required w/preliminary submittal.

Figure 2.1

CHAPTER 3

COVER SHEET

General

This is the first sheet in the plans set. It contains general information concerning the project and the plans themselves. The County will provide a sample cover sheet if available.

Project Data

All general project data are shown on the cover sheet in the following manner:

Project Number, County Name, Road Number and Project Location Map

These are in the form of a title in large heavy letters. They are positioned above the location map. The County name is centered on the top of the cover sheet with the project name directly below.

Where Federal or State project numbers are involved, the corresponding County project number is placed below the Federal or State project number.

Projects that are independently prepared but are to be let in the same construction contract shall have the additional project numbers noted on the cover sheet.

A project location map consisting of a reproduced portion of the Aero Atlas Map or similar map of the County shall be placed in the upper left corner of the cover sheet. It shall be scaled to include the limits of the project. The intent of the location map is to provide enough information so that the project location is easily understood.

Project Map

This map is placed in the center of the sheet and consists of the plans in reduced scale. The intent of the location map is to provide enough information so that the overall project is easily understood. This will make it necessary to show the district and land lot lines and numbers to make the location clear. City and urban limits should be shown were applicable. It is advantageous to show station numbers at 1000 foot intervals. The beginning and end of projects, beginning and end of construction, any station equations, beginning and end of proposed bridges, and exceptions shall be stationed and flagged. Bridge numbers, ROW, easements lines and parcel numbers shall be shown.

An overlay of the outline of the actual mainline plan sheets shall be included along with the sheet numbers.

The scale of the location map should be chosen so that it will not interfere with other features on the cover sheet.

Roadway Classification, Posted Speed and Speed Design

When applicable, the roadway classification, posted speed and speed design shall be placed in a box in the middle of the left side of the cover sheet. This box shall also include the ADT for the roadway.

Asset Box

The net length of new travel lanes, turn lanes, bridge lanes, sidewalk, fiber optic cable, guardrail and the number of new traffic signals shall be included in a box on the cover sheet. In addition, the size and quantity (linear feet) of water, sewer and stormwater pipes should be included if they are part of the project.

Length of Project Box

Lengths of roadway, bridges, bridge culverts, exceptions, and net and gross lengths of the project shall be shown in a box in the center of the sheet below the location map. The net length of the project is computed by taking the total length of the roadway and bridges in feet and converting it to miles, dropping all decimals past a thousandth of a mile, without rounding off. The roadway and bridge mileage shall then be rounded so that their total equals the net length. The construction baseline should be used to compute the length of the project.

The 'Begin Project' and 'End Project' stations are the basis for computing the length. Begin and end construction stations are not to be used in computing the length of the project. The length of right-of-way project may not necessarily be the same as the length of construction project.

Engineer's Stamp

An Engineer's stamp shall be imprinted on Project Drawings in accordance with the "Georgia Law Governing the Practice of Professional Engineering and Surveying", 1980. The cover sheet only of the final plans shall bear the stamp of the engineer responsible for the work shown thereon. The structural engineer shall stamp the structural drawings if civil and structural are involved.

Stamps shall be imprinted using a quick-drying, non-smudge ink. Name and number shall be legible. The Engineer's stamp should appear near the lower right corner of the cover sheet.

North Arrow and Scale

The north arrow shall be shown on the right side of the location map. The map scale shall be shown directly below the map. The scale shall be indicated by using a graphic bar scale with the scale called out underneath. The map shall be oriented so that the arrow will be either toward the top of the sheet or to the right.

Consultant's Name

For plans prepared by a consulting firm, the name and address of the firm shall be shown on the right side of the sheet with the responsible registered Professional Engineer's name below it.

Governing Specifications

The date of the governing GDOT specifications shall be inserted in a note at the lower left corner of the cover sheet.

Railroad Crossing

When the project involves a railroad crossing which falls within the limits of an exception, a sketch shall be shown on the cover sheet showing the station of crossing, and railroad company name. A location sketch on the cover sheet is not required on any project containing plan/profile sheets that cover crossing locations.

CHAPTER 4

INDEX, REVISION SUMMARY, LEGEND AND GENERAL NOTES

Index of Sheets and Georgia Standards Reference

A complete index of roadway plan sheets shall be shown on standard plan sheet format. Standard drawings necessary for the project shall also be shown and listed by standard numbers under the GDOT Standards. Listing the standards by number is all that is required. A sample sheet may be obtained from the Gwinnett County Department of Transportation if available.

Roadway plan sheets shall be assembled as follows:

1. Cover Sheet
2. Index
3. Revision Summary
4. General Notes
5. Typical Sections
6. Summary of Quantities
7. Quantities Required by Amendment (Federal Aid Projects Only)
8. Quantities Required on Construction (Federal Aid Projects Only)
9. Detailed Estimate
10. Traffic Diagrams (if needed)
11. Construction Layout
13. Mainline Plan
14. Crossroad Plan

RW. Right of Way Data Sheets (for small projects)

15. Mainline Profile
16. Crossroad Profile
17. Driveway Profile
18. Intersection Detail Plans or Special Grading (if needed)
19. Construction Staging Plans and Cross Sections
20. Construction Staging Details (if needed)
21. Drainage Area Map
22. Drainage Profiles and Cross Sections
23. Earthwork Cross Sections
24. Utility Sheets
25. Lighting Plans & Details
26. Signing and Marking Plans
27. Signal Plans
28. ATMS Plans
29. Landscaping Plans (if needed)
31. Retaining Wall Envelopes
35. Bridge Plans
37. Miscellaneous Structures

38. Special Construction Details
44. Utility Relocation Plans
50. Erosion Control Cover Sheet
51. ESPCP & Monitoring General Notes
52. Erosion Control Legends & Uniform Codes
53. Drainage Area Map
54. BMP Location Details
55. Watershed Map & Site Monitoring Location
56. Erosion Control Details

RW Right of Way Plans (if a separate set is required)

Add the following note to the index sheet:

> *The GDOT Standards and Construction Details required for this project are listed in the index with the latest known revision date but are not included as part of the plans. The contractor shall be responsible for obtaining and maintaining on the project site the GDOT Standard Drawings and the Construction Detail Drawings listed on the index sheet. Full sized sheets may be purchased by the contractor at his expense from GDOT.*

Revision Summary Sheet

The Revision Summary Sheet shall be shown on standard plan format.

A detailed revision description shall be shown, along with the revised sheet number(s) and date of revision. The date of advertisement for construction is to be considered as the date that documentation of revisions shall begin.

Gwinnett County Standard Legend

Georgia Department of Transportation Standard Legend shall be used. A copy of the standard legend shall be obtained from Gwinnett County Department of Transportation and shall be included in the construction plans. All plans shall adhere to this legend.

General Notes

The General Notes Sheet includes construction notes that are project specific or are not covered under the Standard Specifications. Notes that are in the construction contract may be included on the General Notes Sheet if special notice must be given to the contractor to eliminate a possible source of errors. GDOT notes can be provided digitally, for projects that impact a State Route.

The following is a generic list of General Notes that may be included:

> *All work shall be done in accordance with the Georgia Department of Transportation Standard and Supplemental Specifications, Current Edition.*

All known utility facilities are shown schematically on highway plans, and are not necessarily accurate in location as to plan or elevation. Utility facilities such as service lines or unknown facilities not shown on highway plans will not relieve the contractor of his responsibility under this requirement. "Existing utility facilities" means any utility that exists on the highway project in its original, relocated, or newly installed position. All utility facilities which are in conflict with construction and are not covered as specific items in the detailed estimate are to be removed or relocated to clear construction in advance of his work.

Utility work coordination will be required as a part of this contract. The contractor shall be required to use the one-call center telephone number, 811 or 1-800-282-7411, for the purpose of coordinating the marking of underground utilities. The contractor's attention is called to Sub-Section 105.06 "Cooperation with Utilities". More information can be found at the gaupc.com website. The "811" logo should also be shown.

The following utilities have facilities in the project area:
(Furnish utility name, address, local contact name and phone number)

The total acreage shown on the plans for clearing and grubbing are for information only. The Department of Transportation assumes no responsibility for its accuracy. The contractor shall bid on grading complete - lump sum and it shall be his responsibility to determine the actual acres to be cleared and grubbed. No claims will be considered for extra compensation if the contractor relies on the acres shown on the plans. Costs for items to be removed which do not have a separate pay item shall be included in price bid for grading complete - lump sum.

The contractor shall strictly adhere to dust control regulations. All areas subjected to dust formation must be periodically watered, sufficient to retard dust. All costs for dust control shall be included in price bid for grading complete - lump sum.

The total area shown on the plans for grassing is for information only. The Department of Transportation assumes no responsibility for its accuracy. The contractor shall bid on grassing complete, lump sum, and it shall be his responsibility to determine the actual area to be grassed. No claims will be considered for extra compensation if the contractor relies on the area shown on the plans.

Ingress and egress shall be maintained at all times to adjacent properties. Refer to Sub-Section 107.07 of the Standard Specifications.

It shall be the contractor's responsibility to furnish suitable borrow material for the project and dispose of any unsuitable or waste material.

Horizontal control is based upon Georgia State Plane Coordinate System. See plans for locations and descriptions of monuments used.

All driveways, where access is allowed, shall be placed as directed by the engineer in accordance with rules and regulations for control and protection of Department of Transportation rights-of-way. All driveways that are to be reconstructed shall be replaced, in kind, i.e., asphalt for asphalt, concrete for concrete and asphalt for earth. The driveway locations indicated on the plans are from the best available data. The contractor shall construct new driveways to match the actual field location of existing driveways where they are not in conflict with the rules and regulations. The contractor shall obtain the approval of the engineer prior to making any revisions such as to location, width and/or number of drives to be constructed. Asphaltic and unpaved driveways shall be paved to their construction limits. Where required, the drives shall be paved as follows:

Asphaltic drives

Residential - 1-1/2" recycled asphaltic concrete, 9.5 mm Superpave GP2
only incl. bituminous material & H. lime
6" graded aggregate base

Commercial - 1-1/2" recycled asphaltic concrete, 9.5 mm Superpave GP2
only incl. bituminous material & H. lime
2" recycled asphaltic concrete 19 mm Superpave, GP 1 or GP 2, INCL Bitum Mat'l & H Lime
8" graded aggregate base

Note: If the project consists of roadway asphalt paving use the same asphalt mix design as the roadway.

Concrete drives

Residential - 6" concrete valley gutter
6" concrete driveway

Commercial - 8" concrete valley gutter
8" concrete driveway.

This project lies within the limits of an insect infested area. The contractor's attention is called to the following Sub-Sections or Special Provisions to the standard specifications: A) Sub-Section 107.13D - Insect Control Regulations; B) Sub-Section 155 - Insect Control; and C) Sub-Section 893 - Miscellaneous Planting.

The perforated underdrain shall be placed in areas where wet conditions exist in the subgrade as directed by the engineer.

The contractor shall observe all applicable local, state, and federal safety regulations regarding pipe installation in trenches. No separate payment will be made for any cost incurred to comply with this requirement.

All existing pipe shall be removed unless otherwise noted on plans or as directed by the engineer. Costs for removal shall be included in the price bid for clearing and grubbing.

In areas where Type 2 curb is used, drainage structures 1033D and 1034D will be required. In areas where Type 7 curb is used, drainage structures 1033G and 1034G will be required.

At locations where new pavement is to be placed adjacent to existing pavement without an overlay or where curbing is to be placed across a paved area, a joint shall be sawed on a line established by the engineer to ensure pavement removal to a neat line. Costs for sawed joints, when required, shall be included in price bid for other contract item, except when sawing PCC concrete pavement.

Where existing pavement markings and lines are in conflict with the traffic pattern being used on construction, the contractor shall remove or overlay lines to the satisfaction of the engineer such that the lines do not confuse the traveling public. All remaining lines or markings shall be in accordance with the "Manual on Uniform Traffic Control Devices" or as directed by the engineer. Traffic shall not be allowed on any pavement not properly striped.

The contractor's attention is directed to Articles 104.05 and 107.07 of the standard specifications and the special provisions for traffic control and sequence of operations in regards to maintenance of traffic during construction.

Price bid for traffic control - lump sum shall include, but is not limited to, construction, maintenance, and removal of temporary signing and pavement markings, barricades, channelizing devices, etc. required for maintenance of traffic during construction. All temporary signing and pavement marking shall be in accordance with the "Manual on Uniform Traffic Control Devices", current edition and/or as directed by the engineer.

Staged construction may be required in order to maintain traffic throughout the project. Construction staging plans may be included in this set of drawings and are for guidance. The contractor may elect to design his own staging plan. If so, the contractor's staging plan must be approved by the engineer prior to construction. Any deviation to the stage construction plans, if included, shall be approved by the engineer prior to implementation.

No separate payment will be made for earthwork operations required for detour construction. The cost of detour grading and earthwork operations required solely for detours shall be included in the price bid for other items.

Handicap ramps shall be constructed at all points where sidewalk terminates at curb or is bisected by driveways, if necessary. The exact type of ramp (terminal or on curb radius) may be modified as directed by the engineer.

All cut and fill slopes shall be grassed as directed by the engineer immediately after the slopes are established in order to reduce erosion. If the season does not permit grassing, temporary *mulch shall be used as directed by the engineer. Refer to Section 161 of the Standard Specifications.*

The contractor shall ensure that positive and adequate drainage is maintained at all times within the project limits. This may include, but not be limited to, replacement or reconstruction of existing drainage structures that have been damaged or removed, or regrading as required by the engineer, except for those drainage items shown at specific locations in the plans and having specific pay items in the detailed estimate. No separate payment will be made for any costs incurred to comply with this requirement.

This project has a total area of ________ acres and the expected disturbed area is ________ acres. (The total area is the total area of the right-of-way and easements and the disturbed area is the area that will be cleared and grubbed.)

The Contractor will be responsible for pre-marking all signing, striping, guardrail and handicap ramps. After pre-marking is complete and 72 hrs. in advance of installation, the contractor shall notify the project engineer to coordinate with Gwinnett County Department of Transportation's Operations and Maintenance Division for approval.

A Notice of Intent is required (or not required) on this project.

Aggregate surface course for temporary driveways, including material, haul and placement shall be used at the engineer's direction to facilitate the movement of local traffic through the construction area during inclement weather. When used for this purpose, section 318 of the GADOT Standard Specifications is modified to permit truck dumping on unprepared wet, muddy subgrade. Section 318 is further modified to permit the use of crusher stone as described in section 318.02. The contractor will have the use of the following materials:

a. *Graded Aggregate, Article 815.2.01*
b. *Course Aggregate, Size 467, Article 800.2.01*
c. *Stabilized Aggregate, Type I or II, Section 803.2.01 or 803.2.02*
d. *Crushed Stone, Article 806.2.01*

Concrete Apron Associated with 9031S Drop Inlets may be omitted at the engineer's discretion.

All areas where there are existing catch basins or drainage inlets where the sidewalk is to be constructed; the sidewalk slope shall be adjusted to tie in smoothly with the existing drainage structures.

Temporary erosion control quantities are for estimating purposes only.

Erosion control measures shall be installed prior to or concurrent with land disturbance activities and shall be maintained at all times. Additional erosion and sediment control devices shall be installed if deemed necessary by on-site inspection or as directed by the engineer.

All silt fences must be placed as access is obtained during clearing. No grading shall be done until silt fence installation is complete. It is the contractor's responsibility to maintain all silt fences and to repair or replace any silt fence that is not satisfactory. Erosion control check dams or filter rings shall be placed immediately after drainage structures are in place. All erosion control devices shall be placed according to the plans and as directed by the engineer. See the GADOT Standard Specifications regarding erosion control and the Manual For Erosion And Sediment Control by G.S.W.C.C. The contractor shall be responsible for keeping wetland areas free from siltation. The contractor shall obtain and abide by all Corps of Engineers Rules and Regulations concerning construction adjacent to waterways and maintain water quality.

Orange barrier fence shall be added around all trees that are not to be disturbed.

Construction layout will be required by the contractor. All cost for this item will be included in the price bid for other contract items.

Type of grass or sod used on this project will be required to match any type of grass or sod which may be planted and growing on the adjacent lawn, i.e. bermuda sod for bermuda sod, zoysia for zoysia, etc. No separate payment will be made for any cost incurred to comply with this requirement.

Water and Sewer notes

Notes related to water and sewer plans can be obtained from the Gwinnett County Department of Water Resources (DWR). Contact DWR's Construction Engineering Division at 678-376-7151 to obtain the latest notes.

CHAPTER 5

DRAINAGE MAP

General

The drainage map shall be prepared and included in the drainage report and the construction plans.

Scale

The appropriate scale may be determined by the design engineer with the approval of the County.

Drainage Data Summary Box

Locations, drainage areas, outflows, and sizes are required for all cross structures, regardless of size. Solutions shall also be shown for existing structures (extend cross drain, replace, etc.)

Plan

The following items shall be included in the plan:

1. Stationing shall be shown every 500 feet for all scales less than 1" = 1000. For scales greater than 1"=1000' stationing shall be shown every 5000 feet. Centerline of project with beginning and ending project stations, station equations, beginning and ending stations for exceptions and bridge/bridge culverts shall be flagged.

2. Physical land features affecting drainage, such as lakes, streams, and swamps shall be clearly labeled by name, with direction of flow and applicable buffer. Past high water elevations and date of occurrence, if available and present water elevations along with the dates the readings were taken shall be shown.

3. Existing road numbers and street names, drainage structures, showing type, size, flow line elevations, flow arrows and any other pertinent data. Refer to the County Standard Legend for correct symbols for existing drainage facilities. In a situation of limited space, all data relating to existing drainage structures and pipes may be compiled in a table format. Should the space limitations be such that a table would not fit within the plan view, a supplemental drainage data sheet would be acceptable.

4. Drainage divides and information where applicable, to indicate the overland flow of water. Drainage areas on maps shall be shown in acres.

   Insets shall be used to show areas that are of such magnitude that the boundaries cannot be plotted at the selected scale.

5. All existing structures to be retained and proposed drainage structures, pipes, outfall structures, and retention/detention pond locations shall be shown and noted by structure number.

6. A north arrow in the upper right corner and graphic scale in the lower right corner shall be included.

7. Total disturbed area (area within the construction limits of the project).

8. For all existing culverts being retained and all proposed culverts, show in table format”
   - Station and offset to each inlet and outlet
   - Structure designation and type
   - Skew angle and structure size
   - Runoff coefficients.
   - Pre and post velocities at the outlet for the 50 yr and 100 yr storms
   - Pre and post headwater elevation for the 50 yr and 100 yr storms
   - Total basin area draining to each outlet structure
   - Structure Length
   - Structure Slope

9. For all longitudinal drainage systems retained/modified and proposed systems, show in table format:
   - Station and offset of each outlet at the downstream release point
   - Pipe size
   - Pipe Length
   - Runoff coefficients
   - Pre and post velocities for the peak flows at the downstream release point for the 10yr, 25yr and 100yr storms
   - Pre and post peak flows at the downstream release point for the 10yr, 25yr and 100yr storms
   - Total basin area draining to each downstream release point

Interchange Drainage Map

If projects involve interchanges, a supplemental drainage map on a 1" = 100' or 1" = 200' scale shall be required. The purpose of this detail is to show the small areas needed to calculate pipe sizes for the tabulation of drainage structures within these special areas. Should major drains pass through one of these areas, a cross reference note should indicate the proper sheet which reflects the drainage area for that structure.

CHAPTER 6

TYPICAL SECTIONS

General

Typical sections depict the design elements of the proposed roadway and shall be shown in the form of cross sections depicting the work which is standard or typical within certain station-to-station limits.

The typical sections for a project are established during preliminary design by the design engineer. Usually typical sections are not drafted to scale, but the horizontal dimensions should be proportionate. Typical sections should show typical conditions only. Non-standard conditions that prevail for short distances only should be shown as inserts when not clearly defined in the plans and cross sections.

When establishing the typical section(s) for the project, the designer should utilize a 10’ shoulder for County roads. When sidewalk will be added along the roadway, the 10’ shoulder should include 8” X 30” Type 2 curb and gutter, an 18” grass beauty strip, 5’ wide concrete sidewalk, and a 1’ grass area between the sidewalk and the shoulder break point.

If horizontal dimensions within typical sections are variable, then a range should be provided.

When more than one typical section is necessary for a project, the station limits of each section shall be shown below the typical section title. Transitions from one typical to another shall be included in the stationing of one or the other typical section. Typical sections shall be numbered consecutively. When partial sections are necessary to cover the details, these sections shall be shown near the main typical section to which they apply. If space is not available, they may be grouped on a separate sheet.

Mandatory Information

Typical sections for all projects shall include the following data:

1. Cross Slopes
    a. Cross slopes of roadway pavement, shoulder surfaces, sidewalks and bridge decks shall be expressed as percentages and directional arrows.
    b. Outer slopes shall be shown by ratio, horizontal to vertical, i.e., 4:1, 2:1.
    c. Either feathering details or notes (or both) shall be shown when resurfacing in urban gutter areas is specified.

2. Profile grade point shall be flagged.

3. Include a typical section that shows resurfacing and widening.

4. Include a typical section for cross streets and list all applicable streets.

5. The scope of pavement construction shall be described in a clear, precise manner. Pavement structure information shall be obtained from GCDOT or the designer's approved pavement design and shall be described starting with the surface course and ending with the bottom layer.

6. Sidewalk location and width.

7. Curb and gutter location, size and type.

8. Template dimensions. For typical sections with varying dimensions, the range of dimensions shall be indicated on the typical section and the typical dimension shall be noted.

9. Limits of clearing and grubbing, where applicable.

10. Right-of-Way widths where applicable.

Typical Section Notes

1. For S.E. rates and locations, see roadway plans and AASHTO Guidelines.

2. Location of existing pavement varies with respect to the proposed construction centerline.

3. See roadway plans for location of curb and gutter section. Shoulder may be graded away from roadway to facilitate the slope tie to existing ground but may not exceed 2%. See cross sections for location.

4. In excavated areas 5'-0" or less in width confined between existing pavement and proposed curb and gutter, Class "B" concrete shall be placed in lieu of the base and paving specified on the typical section. Payment will be made at the unit price bid for Class "B" Concrete Base and Pavement Widening. See construction detail.

5. Saw cut and remove existing paved shoulder. Payment for this item is to be included in grading complete – lump sum.

6. Sod area between back of curb and sidewalk.

CHAPTER 7

SUMMARY OF QUANTITIES

General

The summary of quantities shows individual summaries of signs, driveways and drainage items, along with earthwork, where applicable. Quantities for concrete walls, without special design, shall be shown.

Item Quantity "Boxes" and Format

The arrangement of the quantity boxes on the sheet is dependent on the number used and the size each one must be able to contain all of the necessary information. Aesthetics should be considered. Standard notes shall be shown under the appropriate box.

On projects with multiple contracts or Federal aid and non-Federal aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

Standard Notes for Summary of Quantities Sheet

Below are standard notes which may be used on the Summary of Quantities Sheet, as applicable:

1. (Under Summary of Guardrail) "Guardrail limits and locations along the project may be varied based on actual project conditions at the time of construction."

2. Construction layout will be required. All costs for this item shall be included in the price bid for other contract items.

3. (Under Earthwork Summary) It shall be the contractor's responsibility to dispose of waste material.

Summary of Drainage Quantities

The summary of drainage quantities sheet shows the location, size, length, number, and type of drainage structures. This includes quantities associated with culverts, pipe, rip-rap and inlets.

The summary of drainage quantities sheet is in standard GDOT format. Examples may be obtained from the County.

Sheet Setup and Data

A summary of drainage quantities shall be prepared and included in the plans. The structures shall be listed by structure numbers in numerical order. Location of each structure shall be identified by station and offset along the construction centerline.

For cross drains, the summary of drainage quantities shall be tabulated by providing the station, size, length and incidental quantities appropriate for the material detailed in the plans.

For storm sewer, the summary of drainage quantities shall be tabulated by structure number, providing station, location, size, length, type, and incidental quantities. Usually, only one culvert material will be designed for storm sewer. Refer to the Georgia Department of Transportation Drainage Manual for uses of different culvert materials.

On smaller projects, the summary of quantities and the summary of drainage quantities may be placed on one sheet.

For Summary of Driveway Quantities, the following information should be listed:

- Location of driveway
- Driveway number
- Driveway width
- Quantified material type, and applicable quantities

For Summary of Sign Quantities, the following information should be listed for each sign:

- Material type and reflective sheeting type
- Station and location of each new or relocated sign
- MUTCD code or each sign
- Dimensions of each sign
- Square footage of each sign
- Required sign post type for each sign
- Quantity and total length of sign posts required for each sign

CHAPTER 8

DETAILED ESTIMATE

General

The detailed estimate generally follows the summary of quantities sheets in the plan set. It is plotted on standard plan sheet format and a sample may be obtained from GCDOT if available.

Pay Item Numbers

The pay item numbers to be shown shall be standard GDOT item numbers. The pay item number, description, and units shall be shown verbatim. If a given item does not have a GDOT pay item number, contact GCDOT and a number will be assigned.

If duplicate item numbers are required, use A, B, C, etc. after the number. For example:

647-1000A Traffic Signal Installation No. 1
647-1000B Traffic Signal Installation No. 2

The quantities shown shall be total project quantities and should match the cumulative totals shown on the Summary of Quantities Sheets.

Do not use decimals or commas.

Items used by GCDOT:

161-1000	Erosion Control, (Project No. _______)
163-0538	Construct, Maintain and Remove Check Dam
163-0551	Construct, Maintain and Remove Inlet Sediment Trap
700-0200	Grassing Complete, (Project No. _______)
716-2000	Erosion Control Mats, Slopes

If two or more projects are combined in one set of plans, the detailed estimate will have separate columns for each project and a totals column.

When Gwinnett County DWR relocation items are to be a part of the project, the pay item numbers are to follow the Gwinnett DOT pay item numbers outlined in Appendix A of this document.

CHAPTER 9

STAKEOUT PLAN AND CURVE DATA SHEET

General

The staking plan/curve data sheet shows the horizontal alignment and coordinates for the project. Although it is not required for most projects, the staking plan can prove to be of great advantage for large or complicated projects involving large interchanges with a number of diverging routes. This sheet should also show all survey control points. The construction centerlines shall be shown with stationing labeled every 500 feet.

The staking plan shall be prepared on a standard plan format. Scale shall be such that clarity and legibility are preserved even if the plans are reduced to half size. The suggested scale for the staking plan is 1" = 200'. North arrow and graphic scale shall be shown. For large, complicated projects, more than one sheet may be required to clearly depict all required information. Appropriate match lines shall be shown if more than one sheet is required. The curve data shall be shown on the staking plan along the bottom of the sheet unless there is insufficient room. In that case, the curve data may appear on a separate curve data sheet.

Survey Control Points

Survey control points shall be shown on the staking plan along the top of the sheet. Construction centerline and control points with stations and offsets shall be clearly indicated. Each control point shall be clearly labeled and numbered. Coordinates and elevation for each control point shall be shown. Care should be taken to ensure that clarity and legibility are maintained on half size plans.

The format for indicating control point data shall be as follows:

Control Point No. 157
1/2" Rebar
Station 115+94.85, 28.97 Right
N 1,438,624.9719
E 2,331,646.1843
Elev. 951.76

Reference Data

The staking plan and curve data sheet shall show all alignments, curve numbers, curve data, bearings in the direction of stationing, angles at intersections, and intersection equalities, P.C.'s, P.I.'s, and P.T.'s for all curves shall be shown and labeled with stationing.

On small projects, this information may be included on the plan sheets.

Interchanges

Interchange layouts shall be prepared on a standard plan format. The entire interchange shall be placed on one sheet when possible, using a scale of 1" = 200'. In cases of large cloverleaf or directional interchanges, more than one sheet may be required. Appropriate match lines shall be shown. Layouts shall be dimensioned and completely stationed, with all alignment data and construction notes included. All curves shall be assigned a number and curve data. It is preferred that the curve and coordinate data be placed on the same sheet as the interchange layout.

Ramp baselines are usually located on the right edge of the pavement with relation to the direction of traffic, and shall be clearly indicated. Stationing of ramps should be in the same direction as the project.

Ramps shall be named in such a manner so as to avoid confusion. If more than one interchange is included, care should be taken to make ramps from one particular interchange easily distinguishable from the others.

Format

Complete curve data shall be shown for each horizontal curve using the following format:

CURVE __

P.I. Station	
Δ	(Delta Angle with Direction)
D	(Degree of Curvature
T	(Tangent Length)
L	(Length of Curve)
R	(Radius Length)
e	(Superelevation Rate)
P.I. Coordinates (Four Decimals)	

CHAPTER 10

ROADWAY PLAN

General

The Plan sheet shows the project's complete horizontal alignment. Various roadway elements such as pavement width, medians, paved shoulders, curbs, drainage elements, tapers, turn provisions, and intersecting roadways, are also shown on this sheet.

The Roadway Plans shall be prepared on standard plan sheets. Scales used should be such that the sheet is legible when reduced to half-size. Standard scale is 1" = 20'. Scale for large, new alignment projects may be 1”=50’ provided it is agreed to by the County. The north arrow shall be placed on the plan in the upper right corner of the sheet. A graphic scale shall be placed in the lower right corner of the sheet. North arrow and graphic scale shall be shown.

Centerline

The centerline of construction should be centered in the plan portion of the sheet, with stationing running from left to right. When horizontal curves are involved, the centerline shall be positioned on the sheet such as to avoid breaks or match lines.

A "tick" mark shall be placed on the upper side of the centerline at every station. "Tick" marks at 500 foot intervals (true scale) shall be 0.2" long and the station number should be shown above the "tick" mark. The remaining "tick" marks at 100 foot intervals shall be 0.1" long with no station numbers shown.

If a scale of 1" = 20' is used, six stations per sheet should be shown. Each sheet shall begin and end with a whole station. The first and last plan sheets may be exceptions.

Horizontal Curves

P.C. and P.T. points of horizontal curves shall be indicated by small circles. Leader lines shall be drawn from these points and stations identified. P.I.'s may be noted by the use of a small triangle with a short section of tangent on either side. In cases where the curve extends over more than one sheet, the curve data shall be repeated on each sheet showing the curve. Curves shall be numbered beginning with curve number 1 and numbered consecutively for curves on the mainline. Curve numbers may be shown using a 1/2" diameter circle, true scale, with the curve number placed inside or using text, i.e., "Curve 2". Curves shall be labeled above the construction centerline between the P.C. and P.T. of individual curves.

Complete curve data shall be shown for each horizontal curve using the following format:

CURVE __

P.I. Station
Δ (Delta Angle with Direction)
D (Degree of Curvature)
T (Tangent Length)
L (Length of Curve)
R (Radius Length)
e (Superelevation Rate)
P.I. Coordinates (Four Decimals)

Curve data shall be shown on plan sheets as well as on the staking plan.
The curve data shall be placed along the lower border of the drawing, if possible.

Existing Topography

All existing topography shall be shown. Existing roads, streets, drives, buildings, storm drain pipes, surface evident utility features, walls, curbs, pavements, fences, railroads, bridges, drainage structures and similar items shall be drafted and labeled where appropriate. Streams, ponds, lakes, wooded areas, ditches, and all other physical features shall also be shown. No existing utilities shall be shown on the Roadway Plan Sheets but rather shall be shown on the utility plans. Existing gasoline storage tanks within limits of topographical survey shall be located and illustrated on the plan, if required. Existing conditions for final plans shall be shown with dashed lines.

All Environmentally Sensitive Areas (ESA's) shall be shown with the GDOT line code for an ESA, and labeled on all applicable plan sheets. ESA's to be shown include, but are not limited to streams, stream buffers, wetlands, open waters, historic structures, historic property/districts, UST's, and archeological sites.

Topography shall remain fully legible when plans are reduced in size, but shall be less prominent and readily distinguishable from proposed work.

Reference Data

Bearings, in the direction of stationing, shall be shown for all tangent sections.

Station equivalencies, angles with mainline centerline and bearings in the direction of stationing on the crossroad shall be shown for all roads and streets intersecting or crossing the project.

All the survey control points shall be shown. Data for control points shall be shown near the top border of the drawing in the format given in Chapter 9 - Staking Plan/Curve Data Sheet.

Construction and Project Limits

The project's proposed construction limits shall be indicated in the plans. The limits to be flagged and stationed are:

1. Beginning and ending of project, and beginning and ending of construction. The beginning and ending of project should be at least 50’ before and after beginning and ending of construction. If plans cover more than one project, the limits of each shall be clearly identified by station and project number. Limits identification shall be shown both in plan and in profile.

2. The limits of project breakdown necessary for separation of length and quantities for State-aid and non-State-aid projects.

3. The limits of each type of construction classification where more than one type is involved, such as, resurfacing, bridging, widening, and milling.

4. The beginning and ending of exceptions.

5. The limit of construction on side streets.

Drainage Structures and Bridges

Proposed cross drain and storm drains shall be indicated in the plan by a symbol and identified by a drainage structure number only. Box culverts (single or multiple) of 20' total span or more between inside faces of end supports, measured along the center of the roadway, shall be designated as bridge culverts.

Proposed bridges and approach slabs shall be shown by simple outline. Bridges shall be identified by bridge number and their beginning and ending stations noted by station flags. The length of approach slabs shall be dimensioned with the begin and end stations flagged.

The proposed drainage system is indicated by drafting the outline of inlets, manholes, and storm drain pipes with a double line. The pipe size between structures shall be given and the direction of flow shown. Structure numbers shall be provided for inlets, outlets, manholes, catch basins, drop inlets and special structures.

The structure number shall be alpha numeric (A-1, A-2, etc.). The letter designates the system beginning with System "A". The number designates the structure number within the system and shall be numbered consecutively.

Plan Layout

Some of the general requirements for the Roadway Plan sheets are given below. A more complete listing may be found in the Quality Assurance chapter.

1. Existing and proposed right-of-way lines and property lines shall be shown. Land lot lines and numbers and land districts shall be shown. The land district number shall be shown near the lower right corner of the drawing immediately above the title block.

2. Showing detailed information regarding intersections should be avoided when they are a type which can best be shown on the intersection detail plans. Intersections shall be identified by construction centerline intersection stationing.

3. Pavement width shall be shown twice on each plan sheet when the pavement width is constant, and should be located such that they are easy to find. In areas where the pavement width varies, (i.e. flares and tapers), the plus station and dimensions of the travelway shall be shown. Typical dimensions shall also be shown near the extreme left and right of the plan.

4. Curb and gutter, traffic separators, sidewalks, curb cut ramps, retaining walls, etc., shall be shown.

5. Plus stations of radius return points shall be shown and flagged on the plans and on intersection details.

6. Plus stations of radius points of traffic separator or median curb at median openings shall be shown on the plan.

7. Control radii for traffic turns that set median nose locations shall be indicated, unless shown on the intersection detail sheet.

8. Station of end of curb and gutter at side street intersections shall be shown.

9. Limits of pavement and grading at side street intersections shall be indicated.

10. When incidental construction extends beyond the right-of-way lines, permanent slope easement, permanent drainage easement, permanent utility easement (if necessary) and driveway easement limits shall be required and shall be shown on the plan sheets.

11. All superelevations shall be shown on roadway plans denoting end of normal crown, flat section, begin superelevation, limits of full superelevation, end superelevation, and begin normal crown. Begin and end removal of crown may also be shown. Refer to Georgia Standard 9028C for proper nomenclature.

12. Matchlines shall be shown and labeled with the correct matchline station and drawing number.

13. All existing fences within the project limits shall be shown and labeled by fence type.

14. All trees 12” in diameter or greater, and all ornamental trees of any diameter within the project limits shall be shown and labeled by type of tree and diameter

15. All subdivision and commercial signs shall be shown and labeled in the plans.

16. If the roadway plans are to be used as right-of-way plans, two coordinates on the baseline shall be shown on each plan sheet.

CHAPTER 11

PROFILES

General Data

The horizontal scale for the profile sheet shall be 1”=20’ (1”=50’ may be used if prior approval is granted by GCDOT). Station limits of the profile shall correspond to those of the plan sheet. Station numbers shall be placed across the bottom of the sheet just above the title block. The full station number should be shown at every 100' increment. The cross section sheet format shall be used to allow two profiles to be placed on each sheet when possible.

Vertical scale shall be no greater than 1”=10’ unless prior approval is granted by GCDOT. Elevation datum shall be shown on both the left and right sides of the sheet.

The vertical and horizontal scale shall be shown in the lower right corner of the sheet.

The existing groundline profile at the construction centerline shall be drafted using a dashed line. Existing groundline elevations on the centerline shall be noted vertically, just above the station numbers at even 50' increments if at 50' scale or at even 20' if at 20' scale. These elevations shall be placed to the left of the grid line.

Station equations and exceptions shall be shown. Beginning and ending stations of project, construction, intersection, bridge, and bridge culverts and major utility crossings shall also be shown.

Vertical Curves

The proposed profile grade shall be shown by a solid line. Vertical curve P.C.'s and P.T.'s shall be indicated by small circles and P.I.'s by a small triangle with short sections of tangent drafted with a light line on each side. Vertical lines shall be extended from the P.C. and P.T. points and a dimension line placed between these lines indicating the length of the vertical curve. The P.C. and P.T. stations and elevations shall be indicated on the vertical lines.

The profile grade elevations shall be shown vertically just above the station numbers, at even 50' increments if at 50' scale or every even 20' if at 20' scale. Profile grade elevations shall be placed to the right of the grid line.

The curve length dimension and the vertical curve data shall be placed above the proposed profile grade line for sag vertical curves and below the proposed profile grade line for crest vertical curves. The dimensions shall be placed reasonably near the profile grade line whenever possible. The P.I. station and elevation shall be noted, lettered vertically above the P.I. symbol for crest curves and below for sag curves. The "K" value for vertical curves shall be placed below the curve length dimension.

Grades

Percents of grades to 4 decimal places shall be indicated for each tangent section on every sheet. When two tangent grades intersect and no vertical curve is required, the P.I. station and elevation shall be labeled vertically, using the same criteria as for vertical curves.

Special Features

For road/railroad under bridge situations, the cross-section template of the road/railroad under the bridge shall be shown at the appropriate location in profile.

Drainage profiles shall not be shown on roadway profiles, but rather shall be shown on separate drainage profile sheets. Culverts and cross drains shall be shown in cross section on the profiles with the structure size indicated.

Ramps

Ramp profile grades shall be developed along the baseline of each ramp. These profiles shall be shown on standard cross section format. Data required to be shown shall be similar to that required for roadway profile.

The recommended scales for ramp profiles are 1" = 20' horizontally and 1" = 10' vertically.

Driveways

Driveway profile grades shall be developed and numbered along the centerline of each driveway. The existing profile shall either be obtained by field survey, digital terrain model, or from contour mapping. These profiles shall be shown on standard cross section format. GDOT standard valley gutters shall be shown from edge of pavement on roads with curb and gutter. Proposed profiles shall begin at the back of valley gutter with vertical curves and slopes of driveways designed using the GDOT standards for driveways as the criteria.

Driveways shall be designed as closely as possible to existing grades. Driveway grades may be flattened somewhat if the proposed grade doesn't adversely affect a parcel or its structures so that unnecessarily steep driveways may be avoided. Care must be taken to reduce impacts to the property while allowing a reasonable driveway grade.

Recommended scales for driveways are 1" = 5' horizontally and 1" = 5' vertically.

All driveways shall be profiled. Driveway profiles shall show PVI offsets from mainline centerline and elevations, profile grades, and offsets and elevations to tie to existing grade. Show all proposed side drainpipes where required. It is suggested to label and arrange driveway profiles on the sheet in the same format as cross sections.

Title Block

The title block shall be filled out as described in Chapter 1. The third line of the title block shall give the station range for the mainline profile. For cross street or driveway profile sheets, the third line shall give the street name or the driveway station range.

CHAPTER 12

INTERSECTION/INTERCHANGE DETAILS AND SPECIAL GRADING PLANS

General

These sheets provide layouts and details for intersections and interchanges involving turning and weaving movements of vehicular traffic or other areas that require additional details to construct. For a safe and efficient roadway system, these areas must be designed with special attention to channelization, tapers, turn lanes, special drainage, grading, and radii. The sheets shall be prepared on a standard plan format using a scale of 1”=10’ to show details clearly and legibly, at both full and half size. Separate intersection details may not be required when the roadway plans are developed at 1"=20' scale and sufficient detail can be shown on the roadway plan sheets.

Intersections

Intersection details shall be shown on separate intersection detail sheets if sufficient detail cannot be shown clearly on the roadway plan sheets. In cases of simple, non-signalized intersections covering relatively small areas, regular plan format may be used. For larger, more complicated intersections involving channelization, signalization, or long connections, the layout shall be placed on a standard plan format using match lines when more than one sheet is required.

Existing topography need not be shown on these details if it is shown elsewhere in the plans. The general information given is the same as on the plan sheets. Pavement edges curb and gutter, channelizing and median curbs, drainage structures, pavement dimensions, radii, stations of radius returns, and appropriate notes shall be included.

All intersection layouts shall be dimensioned, stationed adequately, and shall include all pertinent construction notes and alignment data. A north arrow and graphic scale shall be shown. Elevations at the edge of pavement between radius returns shall be shown at a 25' minimum interval. When required, contours of proposed pavement shall be shown at intervals of 0.5'.

The scale used shall be 1" = 10'. Widths of turning lanes and turning paths shall be checked for possible encroachments or conflicts.

Interchanges

For projects with interchanges, the final plans set shall include the following interchange sheets:

1. Interchange stakeout plan.
2. Interchange grading and drainage plan.
3. Interchange cross section pattern sheet.
4. Ramp terminal details.
5. Ramp Profiles.
6. Ramp cross sections.

Ramp Terminal Details

Details of ramp terminals with mainline and crossroads shall be shown on separate plan sheets. The scale used shall not be smaller than 1" = 50' (1:500). Standard scale 1" = 20' (1:200) is preferred. Standard Details or Construction Details available from the Georgia Department of Transportation may be used without modification. Complete details of the terminal shall be shown including:

Curve data
Station equality to mainline or crossroad at critical ramp locations
Turning radii, taper/transition lengths, curb/curb and gutter (if any)
Channelization (if any)
Ramp and crossroad intersection station and angle
Median nose data (if any)
Limits of construction
Right-of-way
Limited access right-of-way and fence location
Drainage structures
Spot elevations (as needed)
Roadway dimensions
Station pluses and offsets

Cross Section Pattern Sheet

The cross section pattern sheet shows the entire interchange layout including frontage and access roads, if any, with location and extent of proposed cross sections. Information to be shown shall include:

North arrow and scale
Interchange layout
Access and frontage roads (if any)
Centerline construction and baseline survey
Ramp base lines
Stationing along mainline, crossroads, ramps, access and frontage roads
P. C. and P. T. points by symbol
Bridge outline
Cross section pattern

This sheet shall be prepared on a standard plan format. The scale shall be such that the complete interchange is shown on one plan sheet, with care taken to ensure clarity and legibility if the plans are reduced to half size. Normal scale is 1" = 200'. North arrow and graphic scale shall be shown.

CHAPTER 13

DRAINAGE PROFILES

General

Drainage profile sheets shall include the profiles of all the drainage structures and pipe systems, slopes of pipes, flowline elevations of all weirs, slots, and structures, top of grates, top of manholes, top of catch basins, height of structure elevations, station and offset, index numbers of standard details used and similar data. Drainage profiles also show the vertical relationships of the entire drainage system. During the process of drafting the drainage profiles, potential conflicts with existing or proposed utilities shall be identified and resolved early, thereby avoiding costly time delays during the construction phases.

Required Information

The existing groundline for all projects shall be drafted using a dashed line at the location of the structure. No existing structures shall be shown except those to be incorporated into the proposed drainage system or otherwise modified. These shall be drafted with a dashed line, and their flowline elevations noted.

Proposed roadway grades and proposed structures and profiles shall be drafted with a solid line. The structure shall be located by station to the centerline of construction. Flowline information and hydraulic grade line shall be provided at each structure and at each culvert end along with headwater elevations.

Sections for skewed cross drains shall be drafted along the centerline of the structure.

Right-of-way should be checked at all structure locations and shown. All drainage structures should be built within R/W or drainage easements.

Drainage profiles shall be shown on standard cross section sheets, preferably at 1" = 10' horizontally, but no greater than 1”=20’ horizontally, and 1" = 10' vertically.

For each drainage profile, all necessary information shall be shown by note, including, as appropriate: size, length, end treatments, height of structures and flow lines. The note shall be placed as close to the structure as possible. Georgia Standard numbers shall be shown for end walls, inlets, and other accessory structures and details. Elevations shall be given for manhole tops and ditch bottom. Grate elevations for curb and gutter inlets, and flow direction shall be shown.

For urban projects, structures for storm sewer mains along the project shall be shown in proper sequence and without interruption. Inlets should not be located on return radii. Inlets shall not be located in the way of crosswalks and curb cut ramps. Inlets located beyond the returns of side streets shall be drafted as sections on the side street. If possible, these sections should be placed on the sheet without interrupting the continuity of presentation.

Each drainage system shall be assigned its own unique letter in ascending order from the beginning of the project. Each structure shall be assigned its own unique number. Example: A-1, A-2, etc.

Utility Conflicts

Underground utilities, in close proximity to drainage structures, shall be plotted in conjunction with the drainage profiles and x-sections, so that conflicts may be detected, and to alert construction forces of close conflicts.

CHAPTER 14

RETENTION OR DETENTION POND

General

The retention or detention pond, if required, including the outlet structure, is usually the end point of the drainage system for a particular project. The retention/detention pond detail sheet shall show the pond in plan view with proposed contours, side slopes, fence locations, right-of-way, pond drainage structures with their locations and profiles and any other necessary data pertaining to the pond. A 15 foot wide road shall be graded at a maximum of 20% grade to provide access to the pond. The road shall be grassed or paved and shall extend to the bottom of the pond when the pond is greater than 10 feet deep or 50 feet wide. Show the detention pond 100-year ponding contour and elevation on the plan. Bottom of pond shall have positive drainage. The discharge pipe must be no closer to the nearest property line than the greater of the distance necessary to construct any velocity protection or a flow distance equal to six pipe diameters. Minimum width of earthen dam to be eight feet. Dimension dam width on the plan. Typical pond sections shall also be included on the same plan sheet.

The retention or detention pond detail may be shown on 20' scale detail sheets if adequate detail can be shown.

Profiles of outlet structures for ponds may be shown on the drainage profile sheets.

CHAPTER 15

EROSION CONTROL PLANS

General

Erosion control plans shall be prepared in accordance with the current NPDES permit.

The recommended types and general locations of temporary and permanent erosion control measures to be used on construction are shown on the Erosion Control Plan. Some examples of temporary erosion control measures that should be shown on the plans include silt fence, baled straw erosion checks, sediment basins, temporary slope drains and sediment barriers. Permanent erosion control measures include stone dumped rip-rap, permanent soil reinforcing mat, and concrete ditch paving.

Location and types of erosion control measures to be shown on the Erosion Control Plan shall be based on guidelines included on the Uniform Code System for Soil Erosion and Sediment Control found in GDOT’s Construction Details and the most recent GDOT Uniform Code System for Soil Erosion and Sediment Control Design Guidelines. The design engineer shall also use the GDOT Manual on Drainage Design for Highways, the GDOT Standard Specifications Construction of Roads and Bridges, other GDOT Construction Details, and the Georgia State Soil and Water Conservation Commission Manual for Erosion and Sediment Control in Georgia as reference material sources.

Required Information

Erosion Control Plans shall indicate, at a minimum, the construction centerline with stationing, all edges of pavement, the construction limits, existing and proposed right-of-way, construction easements, locations of all drainage structures, streams, lakes, wetlands and rivers. All required Erosion Control Items shall be shown in bold format with the proper code for the item, as shown on GDOT's Uniform Code System for Soil Erosion and Sediment Control. The drainage map should include the requirements of the NPDES permit, including flows and velocities for both the 50 & 100 year storms. Also include the total project area (site size), disturbed area and runoff coefficient (C) before and after construction.

Plan Sheet Format and Scale

Plans shall be prepared on the standard plan format at the same scale as the construction plans.

Final Erosion Control Plans

All required erosion control devices shall be designated by the uniform code for sediment and erosion control. Refer to the Georgia Department of Transportation’s Uniform Code for Soil Erosion and Sediment Control for minimum requirements. See Quality Assurance Checklist on page 25-8.

CHAPTER 16

ROADWAY CROSS SECTIONS

General

Cross sections depict the existing ground conditions, including all manmade features as sections perpendicular to the respective stations along the construction centerline or baseline. The proposed cross-sectional outline of the new facility with all its functional elements is also shown in this section. Standard cross section sheets shall be used for showing roadway cross sections, and shall be prepared at a scale of 1”=10’ horizontally and vertically. If the entire cross section cannot be shown on one sheet, more sheets may be utilized and appropriate match lines shall be shown with referenced sheet numbers. The scale shall be shown at the bottom right corner of the sheet above the title box.

Required Information

Existing ground lines shall be shown as a dashed line. The existing ground line elevation at the baseline shall be shown. The station number of the section shall be indicated in heavy numerals immediately below the ground line and location base line of survey indicated along the top and bottom of the sheet. Lines parallel to the baseline of construction should show station equivalencies to the baseline of construction.

The surface of existing features such as pavements, curbs, and sidewalks shall be shown with a dashed line.

Existing parallel underground utilities shall be shown when lying within the horizontal limits of the project. Small distribution or service lines need not be drafted.

The proposed roadway template shall be shown with a solid line. Proposed profile grade elevation shall be placed vertically just above the profile grade line. Ditch elevations shall also be shown.

Station equalities shall be shown, even though a cross section may not be plotted at that point. For ramp cross sections, equivalent mainline stations shall also be shown.

The right-of-way or easement limits, whichever is farther, shall be shown symbolically, with a vertical line for each cross section.

The front and back slopes of all cuts should be labeled with the ratio of the slope (eg. 2:1). The order of assembling the cross sections in the plans set shall be:

Mainline
Cross Streets/Side Streets
Ramps

Sheet Set Up

Cross sections shall be shown on a standard cross section format with stations increasing from the bottom to the top of the sheet.

When right-of-way is narrow enough, two columns of cross sections may be placed on a sheet. Cross section placement progresses from left to right, as well as from the bottom to the top of the sheet.

Sections shall be centered on the sheet with the construction centerline placed vertically in the center. In cases where additional lanes are to be constructed adjacent to existing lanes, centering the sections will depend upon the location of the survey centerline and the side on which the new construction is to be placed. Sections shall be oriented such that the complete ultimate section will be approximately centered on the sheet. Profile grade elevations should be shown and written vertically along the construction centerline axis.

As many sections as possible shall be placed on a sheet with sections being spaced to avoid overlapping.

CHAPTER 17

MAINTENANCE OF TRAFFIC PLANS

General

A Maintenance of Traffic Plan (MOT Plan) shall accompany the plans and specifications for a construction project, when staged construction is required. The MOT Plan documents the considerations and investigations made in the development of a comprehensive plan for accommodating traffic through construction work zones.

A MOT Plan describes all actions to be taken to minimize traffic impacts, provides a suggested sequence of construction, and establishes guidelines for channelization and detours. It is important to understand that the detours which are part of the construction plans are the result of the MOT Plan, and are a part of the effort to minimize impacts on traffic.

Format and Scale

The staging plan sheets shall be prepared to the same scale as the construction plan sheets. The staging plans shall be organized by stage, beginning with the plan view, followed by the cross sections and temporary drainage profiles for the respective stage of construction.

Required Information

Specific construction staging sheets shall be prepared using information from the plan sheets and interchange and intersection layout sheets, if necessary. The plans shall conform to the *Manual on Uniform Traffic Control Devices*, Part 6.

Centerline, pavement edge, curb lines, shoulders, lane configurations, intersections, and access openings shall be shown. This may require multiple stages of construction. All stages and detours shall be clear and concise. Separate phases may be required for a given stage of construction.

Locations of existing utilities, which may be in conflict with construction necessary for traffic control, shall be shown.

A narrative, at the beginning of each stage will be presented, describing each step of the work to be completed in the respective stage of construction.

Plan sheets shall be prepared for each stage of traffic control during construction and each traffic pattern that will be used during each phase. The Maintenance of Traffic Plans shall use relevant existing or proposed roadway features for the stage being illustrated.

The plans for each stage of construction shall include staging cross sections illustrating the construction required for the stage. The staging cross section should clearly delineate the portion of the final cross section that is to be constructed in the stage, along with showing any temporary slopes or ditches that are required to be constructed. If temporary pavement is required, a sub-phase within the staging plan may be used with cross sections showing the sub-phase construction.

Staging cross sections shall be shown at no more than 50’ intervals that correspond to the mainline stationing. The cross section for the respective stage of construction should show only the work to be constructed in that stage as a solid dark line. Any work constructed in a prior stage should be shown as existing in a dashed line style. In addition, all cross sections shall include all information required in **Chapter 16** of this document.

Any required temporary drainage structures needed to stage the construction of the project shall have a temporary drainage profile included in the respective stage of construction.

Temporary striping details should be included to illustrate any proposed lane shifts, curves, or detour alignments required during staging. All applicable dimensions, begin and end tapers, curve data, and speed design necessary for contractor layout shall be provided in the staging plan. This information can be shown on the applicable staging plan sheet provided it remains legible.

All proposed temporary barrier shall be shown in both the plan view and cross sections of the applicable stage of construction.

General Notes - Maintenance of Traffic

The following Maintenance of Traffic notes shall be shown on the first sheet of the MOT plans:

1. *All items necessary for compliance with these requirements shall be included in the price bid for traffic control, Lump Sum.*
2. *All signs and pavement markings shall conform to the Manual On Uniform Traffic Control Devices, and Standard Highway Signs, (latest editions).*
3. *All temporary signs shall have high intensity reflectorized sheeting on metal sign panels. Plywood sign panels are prohibited.*
4. *In residential areas signs shall be located on, or as close as possible to, property lines.*
5. *Existing traffic signs shall be maintained by the contractor throughout construction. Maintenance includes replacing damaged and stolen signs, and periodic cleaning of existing signs, barrels, and other construction related traffic control devices.*
6. *Existing pavement markings that conflict with traffic shifts shall be obliterated by the contractor by grinding or paving over. "Black out" paint is prohibited.*
7. *Only reflectorized plastic drums and temporary concrete barriers shall be used adjacent to travel lanes. Type I and Type II barricades and cones shall not be used.*
8. *All reflectorized plastic drums and temporary concrete barriers shall be placed a minimum of 2 feet (0.6 m) from the edge of the travel lanes unless prior approval is granted by the Department of Transportation.*
9. *The contractor shall maintain ingress and egress to driveways at all times.*
10. *All traffic control devices shall be maintained by the contractor so as to not interfere with sight distance along any adjacent side road or driveway.*

11. *Reflectorized drums shall be provided for channelization of traffic in all traffic shifts. Maximum spacing equals the design speed limit for the taper.*
12. *The Department of Transportation reserves the right to modify this Maintenance of Traffic Plan as field conditions warrant. If additional traffic control devices are required these shall be provided by the contractor at no additional expense to the Department.*
13. *All M4-9 signs shall have advisory blades installed below the "detour" sign identifying the closed street that the detour route serves.*
14. *Information signs (informing motorists of the road closure) shall be installed a minimum of 4 weeks prior to road closure. These signs shall be installed at or as near as possible to the point of road closure/beginning of the detour route. (see specifications below):*

NOTICE

(ROAD NAME) WILL BE

TEMPORARILY CLOSED

STARTING (DATE).

FOR INFO 770-822-7400

15. *These signs shall be reflective sheeting on metal. "NOTICE" shall be 5" black letters on a white background. The remainder of the sign shall be 4" white lettering on a green background. The Gwinnett County Department of Transportation, Traffic Division will provide additional sign details.*
16. *The contractor shall perform two (2) night inspections per week (during non-daylight hours) and shall submit a report to the Engineer on the condition of traffic control devices and any maintenance required.*

CHAPTER 18

UTILITY PLANS

General

The purpose of utility plans is to provide coordination between the contractor and the affected utility companies. These sheets show the approximate locations of existing, proposed and relocated utilities, and thus aid the contractor in avoiding possible conflicts or damage to the utilities involved.

Required Information

The utility companies shall verify or show by marking up the prints, the location of their respective utilities. Information shown on these marked up prints shall be used by the engineer to prepare utility plans. All proposed and relocated utilities shall be clearly shown on the plan using standard utility symbology. Existing utilities shall be shown using a dashed line. Proposed utilities shall be shown using a solid line. Disposition of all existing utilities shall be clearly indicated: for example "To Be Removed", "To Be Adjusted", "To Be Relocated", etc. Applicable general notes shall also be shown on the first utility plan sheet.

Sheet Format and Scale

The utility plan shall be prepared on the same format and base information as that of the plan sheets. Scale shall be the same as that used for the plan sheets. Topography need not be shown, however, planimetric information shall be shown.

CHAPTER 19

BRIDGE AND WALL PLANS

General

Bridges and retaining walls shall be designed in accordance with the GDOT Bridge and Structures Design Policy Manual (Current Edition). All references to GDOT with respect to project/structure ownership shall be understood to mean GCDOT.

CHAPTER 20

SIGNING AND PAVEMENT MARKING PLANS

General

Signing and marking plans shall be in accordance with the Manual of Uniform Traffic Control Devices and any applicable Gwinnett County standards. Signing and pavement marking plans shall be approved by the Gwinnett County Department of Transportation, Traffic Division.

These sheets show all roadway signs and pavement markings as they should appear upon completion of the project. Typically, asphalt pavement edge markings are to be wet weather thermoplastic with all other markings to be thermoplastic with the exception of temporary condition striping, bike lane markings, and turn lanes that are temporarily blocked out until traffic counts justify use. Paint markings shall be used for bike lane words and symbols.

Tabulation of Quantities and Standard Notes

The tabulation of quantities shall be prepared on the standard plan format and shall show quantities, standard sign numbers, pay item numbers and size of sign if not shown in plan for all bid items. These quantities shall be shown on the Summary of Quantities Sheet and on the Detailed Estimate. Standard notes referring to item numbers shall also be shown on this sheet.

On contracts with multiple project numbers or Federal aid and non-Federal aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

General Notes - Signing and Pavement Marking Plans

All general notes pertaining to signing and pavement marking shall be shown on the first signing and marking sheet. The following notes shall be included:

PAVEMENT MARKING NOTES

1. *All items necessary for compliance with these requirements shall be included in the price bid for the specific item.*
2. *All signs and pavement markings shall conform to the <u>Manual On Uniform Traffic Control Devices</u>, (latest edition) and any applicable Gwinnett County standards.*
3. *Raised Pavement Markers (RPM's) shall be provided per Gwinnett Department of Transportation Standard Details. Raised pavement markers shall be Type III Red/Clear.*
4. *All 5” pavement edge and centerline markings shall be wet weather thermoplastic and all other markings shall be thermoplastic unless otherwise noted.*
5. *Pavement markings shall be per GDOT Construction Details.*
6. *Yellow edgelines shall be used around all medians.*

7. *Standard skip pattern shall consist of a 10' segment with a 30' gap. "Chicken" tracks shall consist of a 2' segment with a 6' gap.*
8. *The contractor will be responsible for pre-marking all signing, striping, guardrail and handicap ramps. After pre-marking is complete and 72 hours in advance of installation, the contractor shall notify the project engineer to coordinate with Gwinnett County Department of Transportation's Operations and Maintenance Division for approval.*

SIGN NOTES

1. *All signs shall be high intensity grade sheeting (on metal) unless directed otherwise by the Engineer.*
2. *All R1-1 (stop) signs shall be 30" unless otherwise noted and installed on 3 lb/ft. ribbed back, galvanized, u-channel posts, 12' in length.*
3. *In residential areas signs shall be located on, or as close as possible to property lines.*
4. *All "Keep Right" (R4-7) signs shall be installed 10' from the end of the median. Refer to Median Nose Hole Detail.*

Plan Sheet Format and Scale

The plan sheets shall be prepared on a standard plan format and at the same scale as the roadway plans. For simple, uncomplicated projects, or sections of a project, it may be possible to "stack" two plans on one sheet, one below the other. Clarity and legibility shall be preserved in all cases.

A north arrow and graphic scale shall be shown. If two plans are "stacked" on one sheet, then each plan portion shall contain a north arrow and graphic scale.

Required Information

The basic information pertaining to roadway geometrics and project limits required on the signing and pavement marking plan sheets is the same as that required on the plan sheets. Topography and construction details need not be shown. Utilities, drainage, lighting, driveways, etc., shall be checked for conflicts. All roadways and driveways shall be shown.

All pavement markings shall be clearly shown and labeled with their widths, color, and spacing specified. Stop bars and pedestrian crosswalks shall be shown at all intersections. Refer to County standards for striping sizes and design criteria. The location of raised pavement markers and delineators shall be indicated by specifying the type, color, spacing, and limits of application by stations. All regulatory, warning and directional signs shall be shown at the proper locations. Each sign face shall be shown in close proximity to its respective sign with a leader line connecting the sign location and sign face. Each sign face shall be oriented to the plan sheet to be read as viewed from the direction of travel along the roadway. The location of all signs shall be indicated by station. The standard sign designation, or assigned number if non-standard, shall be shown for each sign.

Any signs to be mounted on signal span wires or mast arms shall be shown on the signing and marking plan and the signalization plan.

Begin and end project stations shall be shown.

Required Elements

Guide Tracks:	Guide "chicken" tracks shall be shown for all dual turn lanes (WB-50 turning template) starting at the stop bar and ending at the first skip line. Typical "chicken" tracks shall be 5" dashed white (2' segment, 6' gap). "Chicken" tracks shall also be shown for all turn lanes in curves. "Chicken" tracks shall start at the beginning of the taper and continue to full lane width for the turn lane (at full lane width the 5" solid white line begins).
Turn Arrows:	Turn arrows shall be shown for all exclusive lanes starting 15 feet from the beginning of the stop bar (or beginning of radii at unsignalized intersections). Subsequent arrows shall be shown spaced 100 feet apart (if lane length warrants). If turn lanes exceed 150 feet, "ONLY" legends shall be shown centered between the first and second arrows.
Crosswalks:	Crosswalks shall be shown across all public side roads to connect sidewalks. One crosswalk shall be shown across the major roadway at each signalized intersection. Typical crosswalk is 8" solid white with an 8' clear space between the crosswalk lines.
Edge Lines:	Edge lines shall be shown for all public roadways, except where curb and gutter is used. Outside edge lines shall be 5" solid white. Inside edge lines shall be provided on median divided roadways and are to extend around the median nose (no break). Typical inside edge line is 5" single solid yellow.
Stop Bars:	All stop bars shall be 24" solid white.
Painted Islands:	Refer to Georgia Department of Transportation Standard Details for more information regarding painted islands and other pavement markings at intersections.
Keep Right Signs:	Keep Right (R4-7) signs shall be shown in all medians and islands separating two-way traffic. Typical location of R4-7 signs is 10' from the nose of the island.
Signal Ahead Signs:	Signal Ahead (W3-3) signs shall be shown for all signalized intersections.

Advisory Name Blades: All Signal Ahead (W3-3), Cross Road (W2-1) and Side Road (W2-2) warning signs shall have 6 inch "black on yellow" (4 inch lettering) advisory name blades installed below the diamond sign indicating the name(s) of the approaching intersection street(s).

Lane-Use Control Signs: "Right Lane Must Turn Right" (R3-7R) and "Left Lane Must Turn Left" (R3-7L) signs shall be provided only when a through lane becomes a lane that must turn. Where needed, the first sign should be shown approximately 50 to 100 feet from the beginning of the solid white line for the must turn lane with subsequent signs installed approximately 200 feet apart.

Speed Limit Signs: Speed limit (R2-1) signs shall be provided a maximum of every one-half mile on the major roadway and within 200-300 feet of all major intersections. Speed limit signs are also to be shown on side roads within 200 feet of the major roadway.

Street Name Blades: All street name blade signs shall comply with current Gwinnett County specifications.

SPECIAL SIGNS

Special signs may be required for some projects such as limited access roadways, controlled access roadways, or interstates. The requirements for special signs are given below.

Sign Detail Sheet

The sign face with the complete message layout with legend spacing (vertical and horizontal), margins, border widths and corner radii shall be shown on the sign detail sheet. This sheet should be prepared on the standard plan sheet format to any convenient scale that will preserve clarity and legibility at half-size reduction of plans. For multi-support roadside signs, cross sections may not be included in the plans set, but the pole data shall be tabulated on the sign detail sheet.

Overhead Sign Cross Section and Support Structure

The sign cross section sheet shows the location and clearance of overhead sign(s) in cross section. A standard profile format should be utilized. The cross section of the roadway at the sign location shall be shown and fully dimensioned. The recommended scale for the cross section is 1" = 5' horizontally and vertically. For overhead signs, the support truss and columns and foundations should be designed by the design engineer from information shown on the sign cross section sheet. Overhead signs shall be of diamond grade sheeting.

CHAPTER 21

TRAFFIC SIGNAL INSTALLATION PLANS

General

Traffic signal installation plans shall be designed in accordance with the Manual on Uniform Traffic Control Devices and GDOT Traffic Signal Design Guidelines, (current editions). The signalization plans show the complete construction details, electrical circuit, signal phasing and other relevant data.

Tabulation of Quantities and Standard Notes

The tabulation of quantities shall be included on the Summary of Quantities Sheet and on the Detailed Estimate, as appropriate.

General Notes

The general notes shall list special signal design information such as controller operations, item number descriptions, loop installations, signal heads, signal poles, interconnect cable, maintenance of traffic and computer interface. Current revisions of the notes should be obtained from the Traffic Signal & ITS section through the GCDOT Project Manager.

Plan Sheet Format and Scale

Traffic signal installation plans shall be prepared following standard plan format using a scale of 1”=20’. Match lines or break lines will be necessary on intersections with a posted speed limit of 35 mph or higher. A scale of 1”=30” may be used to fit all design elements onto one plan sheet. Details at a scale of 1”=10’ may be necessary to show all design elements on a corner, particularly cabinet corners.

Traffic Signal Installation Plan Base Sheets

The basic information requirements include roadway geometrics (extending as necessary back from each main street stop-bar), street names, construction stationing, curb and gutter, drainage inlets, sidewalks and right-of-way lines as similarly required on the plan sheets. Underground and overhead utilities, and roadway lighting structures that may cause construction conflicts with signal components shall be shown. Existing traffic signals and equipment shall also be shown. Pavement markings required on the signing and marking plans shall be shown. All locations shall be checked for potential conflicts.

Traffic signal installation plans shall typically include a single mast arm/strain pole located on each corner of each signalized intersection. A mast arm pole foundation location should be approximately 10' from the back of curb of each intersecting street. Mast arm lengths should be limited to 65 feet. A strain pole should be located outside the required clear zone. If that is not possible within the final right of way, notify the project manager. Intersection geometry, utilities or historic references will influence the choice of pole type.

Final Traffic Signal Installation Plans

Final traffic signal installation plan design shall be coordinated with the Gwinnett County Department of Transportation Traffic Signal & ITS Section or its designee. In addition to the above requirements for traffic signal installation base sheets, final traffic signal installation plans shall follow the GDOT Traffic Signal Design Guidelines with the following exceptions:

> Loop Detectors - 6' x 6' setback loops on the main street and 6' x 40’ quadrupole loops for side street and left turn lanes. Setback loop distances from the stop bar shall be based on a 6 second passage time, not the 5 second time GDOT uses.
>
> Electrical service location
>
> Location of signal poles (station and offset)
>
> All equipment shown on the plan shall be clearly labeled and their respective item numbers and quantity indicated.
>
> A separate traffic signal installation plan shall be prepared for each signalized intersection involved in the construction project. The graphics file for each intersection shall be provided to the Traffic Signal & ITS Section in AutoCAD format.
>
> Any span wire mounted signs shall be shown for information purposes only and cross referenced to the appropriate signing and pavement marking plans.

CHAPTER 22

COMMUNICATION PLANS

General

Communication plans shall be designed in accordance with the Manual on Uniform Traffic Control Devices, the GDOT Traffic Signal Design Guidelines and the GDOT ITS Design Manual, (current editions). The communication plans show the complete construction details, electrical circuit and other relevant data.

Tabulation of Quantities and Standard Notes

The tabulation of quantities shall be included on the Summary of Quantities Sheet and on the Detailed Estimate, as appropriate.

General Notes

The general notes shall list special design information such as item number descriptions, interconnect cable, maintenance of traffic and computer interface. Current revisions of the notes should be obtained from the Traffic Signal & ITS section through the GCDOT Project Manager.

Plan Sheet Format and Scale

Communication plans shall be prepared following standard plan format using a scale of 1”=50’. Match lines or break lines will be necessary between plan sheets. Details at a scale of 1”=10’ may be necessary to show all design elements on a corner, particularly cabinet corners.

Communication Plan Base Sheets

The basic information requirements include roadway geometrics, street names, construction stationing, curb and gutter, drainage inlets, sidewalks and right-of-way lines as similarly required on the plan sheets. Underground and overhead utilities, and roadway lighting structures that may cause construction conflicts with communication components shall be shown. Proposed traffic signals and equipment shall also be shown. Pavement markings required on the signing and marking plans shall be shown. All locations shall be checked for potential conflicts.

Communication plans can typically include strain poles with a CCTV camera systems to view each signalized intersection. The poles should be designed to provide a camera height of 40 to 45 feet above the road surface. Strain poles should be located outside the required clear zone. If that is not possible within the right of way, notify the project manager.

Final Communication Plans

Final communication plan design shall be coordinated with the Gwinnett County Department of Transportation Traffic Signal & ITS Section or designee. In addition to the above requirements for communication base sheets, final communication plans shall show:

> Electrical service location
>
> Fiber Allocation Tables
>
> All equipment shown on the plan shall be clearly labeled and their respective item numbers and quantity indicated.
>
> The graphics file of the communication plans shall be provided to the Traffic Signal & ITS Section in AutoCAD format.

CHAPTER 23

ESTIMATION OF QUANTITIES

General

Quantities shall be calculated, measured, etc. in keeping with standard GDOT practices. Any departures from these practices shall be by permission from the County.

Rounding

Quantities must never be rounded down. For quantities less than one unit, use one unit. Items to be paid for per each shall not be rounded. For quantities of less than 1000 units, round up to the nearest whole number. For quantities greater than 1000 units, round up to the next highest increment of 10. For quantities greater than 10,000 units, round up to the next highest increment of 100.

The general guidelines above may be used unless noted otherwise below.

Paving Quantities

Paving quantities shall be estimated and paid for by the ton. This includes all asphaltic concrete and asphalt concrete leveling. Typically, aggregate base courses will be measured and paid for by the ton.

Quantities for asphalt items shall be paid for by the ton and rounded to the nearest 10 tons.

Erosion Control Quantities

Grassing shall be paid for as Grassing Complete, Lump Sum. Show acreage to be grassed and add note that the quantity is for information only.

If Item No. 700-0200 - Grassing, Lump Sum is used, lime, fertilizer and nitrogen will not be measured separately for payment; therefore, no bid items would be required for these items. Quantities for these items shall be included for "information only." Refer to Sections 161, 163, and 700 of the Standard Specifications.

Quantities for other erosion control items such as silt fence, baled straw erosion checks, etc. shall be estimated based on the Georgia Soil & Water Conservation Commissions current guidelines. See page 8 – 1 for Gwinnett County items used.

Earthwork

Earthwork will be paid for under Grading Complete.

Guardrail

Guardrail quantities shall be rounded to the nearest foot using even panels of guardrail (12' - 6" sections). Generally, it is best to set begin and end guardrail stations to allow rounding up to the nearest multiple of 25', since final guardrail locations may be determined in the field by actual field conditions.

Storm Drain Pipe

Storm drain pipe and side drain pipe quantities shall be rounded up to even joint lengths on the Summary of Quantities Sheet for each span of pipe. Use even 4' or 8' joints for concrete pipe. This implies that the length shown on the drainage profiles may not agree with the total shown on the summary of quantities.

CHAPTER 24

RIGHT-OF-WAY PLANS

The following requirements are considered as a minimum for the preparation of right-of-way plans. Additional information may be required to be included on the plans over and above that hereinafter outlined due to the nature of the Project. The design engineer shall include this information at no additional compensation. Strict adherence to the minimum requirements hereinafter by the design engineer will be required unless written permission to deviate from them has been obtained from the County.

Delineation

Important features of the Right-of-Way plans must be clearly shown. These include right-of-way lines, easement limits, property lines, improvements, parcel identification numbers, addresses, tax map identification numbers and dimensions. These and other pertinent matters shall be placed on the plans so that they are readily distinguishable and easily read and identified. Hatch patterns should match GDOT hatch patterns. In any case, the drainage easement should be easily distinguishable from slope easement.

Size of Plans

The detail plans and cover sheets shall be prepared using the same size and scale requirements as for the construction plans. The scale of Right-of-Way plans shall match the scale of the construction plans so that the original drawing can be reduced to an 8-l/2" by 11" size drawing for use as deed and condemnation plats and still retain legible details and dimensions. Since plans are recorded, each plan page should show project name, project number, consultant, date of plan and most current revision.

Property Lines

Property lines shall be accurately located and concisely depicted on the plans with adequate ties to the centerline and required right-of-way so that a legal description can be drawn for the deeds and condemnations. The name of the owner or owners shall be clearly shown for each parcel. Dimensions and bearings on property lines outside the right-of-way are not to be shown except by plotting to scale; however, dimensions and bearings on property lines within the right-of-way shall be clearly and accurately shown (this may be shown on a separate data sheet). If the property line is involved with a horizontal curve, the arc length and radius of curve for the property line is to be shown. The back property lines on all parcels shall be shown on the property map sheet.

Property corners inside the required right-of-way and points of intersection between property lines and the required right-of-way lines are to be located by a full station and distance to the centerline. Coordinates for property corners are also to be shown. The coordinates can be shown on the drawing directly underneath the property corner station and offset or on a separate sheet containing property corner identification numbers and the coordinates. The property corner identification number is to be clearly indicated on the drawing along with the station and offset for the corner. Property corner identification numbers are to run consecutively.

Right of Way and Easement Tables

Right of way and/or easement tables shall be prepared. Each entry shall include the parcel number, the property owner's name and the tax identification number. One table shall be prepared for each tract of ROW or easement type. Each break point along the existing ROW, proposed ROW or proposed easement line shall be listed with station & offset to the center line of the appropriate roadway. When the existing or proposed ROW or easements are in a horizontal curve, an arc length, chord bearing, chord length, radius and degree of curve shall be included between points at the beginning and the end of the curve. At the bottom of each table will be the required ROW and/or easement, including driveway easements, as appropriate in both square feet and acres. The area in square feet will be calculated to the nearest hundredth (2 decimal places) and the area in acres to the nearest thousandth (3 decimal places).

Improvements and Culture

All pertinent data that may affect the cost of the right-of-way should be indicated on the plans. Some of these include structures, roads, streams, ponds, city limits, orchards, fences, wells, springs, and various improvements. If improvements located outside the Right-of-Way might have an influence on the appraised value, these should also be shown to scale on the plan sheet (e.g. buildings and houses). All buildings must be delineated. All trees 12" in diameter or larger shall be shown.

Right-of-Way

In general all permanent structures and facilities which require maintenance by the County shall be placed on right-of-way or permanent easements. Sufficient right-of-way will be acquired to allow for necessary construction and maintenance, and every effort should be made to make the right-of-way as uniform as possible. Exceptions to this will be considered in certain circumstances with the approval of the County. Minor drainage structures may be placed on permanent drainage easements.

Easements

Required easements shall be accurately shown on the plans, and shall be adequately dimensioned on the right-of-way plan so that they can be precisely located on the ground. The areas of all easements shall be shown in square feet to the nearest hundredth of a square foot.

The easement shall be clearly labeled as to use, such as construction, slope, drainage, utility, driveway or detour, as appropriate. If the easement is for a type of construction that does not require maintenance by the County, i.e. temporary, it shall be labeled; "Easement for the Construction of ___________" with the actual purpose of the easement specified in the plans. All easements shall begin as permanent easement with the exception of temporary detour, demolition, driveway and temporary sediment pond easements.

If the easement is for a use that requires future maintenance, i.e. permanent, it shall be labeled; "Easement for the Construction and Maintenance of ___________ ." Typically all easements will be for "construction and maintenance." The type of easement used will be at the direction of the County.

Subdivisions

In subdivisions, the remaining property shall be shown to scale. In cases where the back of the lots cannot be shown to scale, a break may be shown on the property lines with the distance to the back of the lot shown approximately in feet. It may be necessary, in some instances, to include insets on the right-of-way detail plan to adequately show information pertinent to the individual lots. Lot and block numbers shall be shown. The subdivision may be shown on the cover sheet as an outline of the entire subdivision with a notation as to the parcels included. All roads or streets, including names, should be either shown on the detail plan or cover sheet. Comments under "Property Lines" cover additional data required for subdivisions.

Railroad Crossings

Intersections with the centerline of railroads shall be tied into the right-of-way centerline by station and angle, showing width of the right-of-way, name of railroad, each track by symbol and distance, and direction along the railroad right-of-way to the nearest mile post number.

Intersecting Roads and Existing Streets

The intersection of all paved and maintained public roads are to be tied by station and angle and equated to the station of the survey of the intersected road. The name of the road, state and federal routes, if any, and the right-of-way width of the road shall be shown. Details of private roads and access roads to parking lots and commercial centers shall be shown on the Right-of-Way plans. A thorough investigation shall be made to establish accurately the existing right-of-way of all intersecting roads and the existing Right-of-Way of roads parallel to the proposed project.

Limited Access

On limited access projects, including partial limited access, the access control lines shall be shown by the conventional limited access symbols. In areas where the limited access line and the right-of-way lines are in the same location both shall be indicated. At the beginning and ending of limited access at interchange or crossroads, an arrow indicating the exact ending or beginning point with the symbols E L/A or B L/A shall be shown as appropriate. If there are any intermediate breaks in the limited access, these must be clearly shown. Where the Right-of-Way and limited access lines coincide, they shall be labeled "Required R/W & Limit of Access". Where drives break the limit of access, show a distance between the E L/A and B L/A, but do not show a distance through the B L/A and E L/A.

Parcel Numbers

Each parcel of Right-of-Way or easement under one unity ownership and in one body of land shall be given the same project parcel number. Numbers shall be assigned to parcels starting with parcel one at the beginning of the project and numbering consecutively through the end of the project. Gwinnett County tax map parcel numbers shall be cross referenced and notated for each project parcel. If it is necessary later to split a parcel or another ownership is found, additional parcels may be shown by adding a suffix of A, B, etc. to the number of an adjacent parcel. Once parcels have been numbered and right of way plans have been submitted to the County they shall not be renumbered.

Areas

The areas of required right-of-way, the remainder on the left, and the remainder on the right shall be shown on the right-of-way plan for each parcel. The symbols to be used shall be: RR = Area Remaining on the Right of the Right-of-Way Line and RL = Area Remaining on the Left of the Right-of-Way Line. Required right-of-way shall be referred to as "Required Right-of-Way" or "Req'd R/W". These areas shall ordinarily be shown in acres and square feet. The required area shall be computed to the third decimal for acres and to the nearest hundredth of a square foot. Remainders shall be shown to the same precision as the existing parcel area.

During the review process, if a determination is made by the County that a parcel remainder is an uneconomic remnant, the plans shall be revised by the design engineer as follows:

> Required right-of-way shall remain the same.
>
> The property lines of the remnant shall be labeled "Limit of Property Acquisition".
>
> The remnant area shall be identified using the subject parcel number with an "R" suffix. For more than one remnant the suffix shall be R-1, R-2, etc. Do not show large remnants as required right-of-way. The design engineer may be required to prepare a boundary plat for the property so the County can dispose of surplus property.

Cover Sheet

Cover sheets, for large projects with separate right-of-way plans, shall meet the same requirements as for construction plans. A "Length of Project" box shall be included on the sheet. The length of the right-of-way project is not necessarily the same as the construction project length, but is to be the actual length of the right-of-way project. When the beginning or ending stations are different, left or right, then the greater length shall always be used; and in every case it is the beginning and ending of the required right-of-way and/or easements. Provisions shall be made on the cover sheet for a revision block so all revisions on the detail sheets can be listed on the cover sheet. The cover sheet revision block is to indicate revision date and sheet numbers only. The cover sheet shall include beginning and ending stations of the right-of-way project, project termini of construction contracts, a north arrow, graphic scale of cover sheet, date of plan completion, signature and a valid Professional Engineer or Registered Land Surveyor stamp, and, if available, land lot lines and numbers, Land Districts or Georgia Militia Districts. Parcel numbers shall also be shown on the cover sheet. Limits of Access shall be shown for projects where there are existing limits of access, and/or where access rights are being acquired as part of the right of way acquisition.

Property Map

A right-of-way property map or property maps, when required, shall be prepared at a scale that shall adequately reflect property lines, roads, streets, and other appropriate culture after the sheet is reduced to 8-1/2" x 11" letter size or 8-1/2" x 14" legal size. The property map shall show the full property lines of large property holdings, and if property lines would extend beyond the limits of the map, broken property lines may be shown. It is usually necessary to indicate the entire property so that all access roads to the property can be shown for the benefit of the appraiser and reviewing appraiser. The right-of-way project number should be shown at the top right corner of the sheet. A north arrow shall be shown in the upper right corner and a graphic scale shall be shown near the lower right corner of the drawing.

Property maps shall show the parcel number for each parcel having required right-of-way and/or easements. A table shall be shown giving the parcel number, the property owner's name, the property address, the land lot number, tax map parcel number, deed book number and deed book page number.

General Information for Plan Sheets

General information that shall be shown on each plan sheet, in addition to that previously mentioned, includes:

1. The survey centerline and any other related centerline, clearly labeled.
2. The construction limits, based upon approved preliminary plan, profile, and cross sections, shall be properly identified.
3. The project number and date in each title block.
4. Paving lines indicated through all intersections, crossover, interchanges, and driveways.
5. North arrow.
6. Revision blocks with space for dates and brief description of revision.
7. Right-of-way legends.
8. Each sheet shall be initialed and shall bear the date of plan submittal.
9. Control points, centerline bearings and any other information necessary to layout the ROW.

Sources of Information

The sources of information that should be utilized in compiling data for the preparation of right-of-way plans are numerous. Some of the information required for right-of-way plans cannot be economically obtained by regular survey parties. It may be necessary to research additional sources to obtain the needed information to complete the right-of-way plans. It may be necessary to check with the Clerk of Court's Office, and/or Planning and Development, for information in regard to subdivisions, commercial developments, and property transactions. The Gwinnett County Department of Transportation may have additional information on existing right-of-way. Ownership will be formally determined from the preliminary title check.

Aerial mapping furnished by the County and those available at the County Tax Assessor's Office are often valuable in locating property lines, land lot lines, access roads, streams, ponds, and various other improvements. County Engineers and the City Engineers may have reference maps which provide additional data. The U. S. Geological Survey, the U. S. Forest Service, and the U. S. Coast and Geodetic Survey maps can furnish pertinent information. The railroad evaluation maps shall be obtained and compared if railroad company right-of-way limits appear to be within the required project right-of-way. Utility company maps shall be compared for data concerning their easements.

Right-of-way plans are a legal document and sometimes end up in court, so the information must be as accurate as possible. The design engineer is responsible for utilizing whatever data necessary to prepare an accurate set of right-of-way plans. Copies of all deeds, plats and other information used to create the right of way plan shall be provided with the initial submission of the right of way plans to the County.

Other General Requirements

The following are additional items which the design engineer shall follow in the preparation of right-of-way plans:

1. Make sure that linework and text on plans are dark enough to show on a reduced 8-l/2" x 11" print. Property lines and construction lines should clearly stand out. If base map data interferes with being able to distinguish property and construction lines, the design engineer, at his expense, shall redo the right-of-way plans to correct the problem to the satisfaction of the County. Text must not be overwritten by other text or linework.
2. Full station and plus shall be used on all right-of-way, easement, and property lines rather than the plus only.
3. Do not shade right-of-way plans.
4. Do not begin or end (if possible) projects in the middle of a parcel if there is to be a future project.
5. For Access Rights only, provide parcel number, owner, linear feet of access rights and parcel remainder (total area).
6. Do not use the same symbol for driveway easement, drainage easement, or construction easement. The standard legend shall be used for all plan symbology.
7. Show the Property Owner Information, North Arrow, Remainders, Construction Limits, and Stations and Offsets.

8. The design engineer shall become familiar with the County's regulations concerning driveway locations and median openings. Corrections to the right-of-way plans as a result of the County's review to conform with these regulations shall be made by the design engineer at no additional cost to the County.
9. When a plan sheet is revised after the plans have been accepted by the County, the revision block shall be completed. The revision block shall include date, initials of responsible engineer, and brief description of the revision. The revision shall also be noted on the cover sheet.

Number of Copies Submitted

The design engineer shall submit plans for (90%) review by the County per the Demand Services Agreement. The submission shall have undergone a formal Q.A. review by the design engineer prior to submission. The checklist located elsewhere in this chapter is to be used by the design engineer as a guide for checking the plans. The County will review the plans for conformance with the criteria set forth herein. Upon receipt of the County's review comments, the design engineer shall make any corrections necessary. The design engineer shall resubmit two sets of prints of the corrected sheets for further review and approval by the County. Any corrections necessary as a result of this review shall be made by the design engineer.

Requirements For Final Right - Of - Way Plans

A. COVER SHEET

1. Project Number and County at the bottom, including any phase of section number.
2. Location Map
3. Limited Access Project Note, if applicable
4. North Arrow
5. Begin and End Right-of-Way Acquisition
6. Length of Project
7. Completion Date (date signed and sealed by Consultant's Project Engineer or his designee, after final County approval)
8. Signed and sealed by Consultant
9. Program Item Number (R.O.W. P.I. Number), if applicable.
10. County Line, with counties clearly labeled (if applicable).
11. Dual projects plans clearly identify each project.

B. PROPERTY MAP

1. Land Lot Numbers and Lines
2. Land District Numbers and Lines
3. G.M.D.'s Numbers and Lines (if applicable)
4. North Arrow
5. Street Names (including Mainline, State Route, and U.S. Number)

6. Back Property Lines (include property map, if necessary)
7. Existing and Required Right-of-Way (labeled and shown)
8. Begin and End Right-of-Way Acquisition
9. Parcel Numbers
10. Limited access labeled and shown required and existing with appropriate symbols
11. Dual project plans clearly identify each project.
12. Listing of parcels, including parcel number, property owner's name, property address, land lot number, tax map parcel number, deed book number, and deed book page number.

C. PLAN SHEETS

1. Land Lot Numbers and Lines
2. Land District Numbers and Lines
3. GMD Numbers and Lines (if applicable)
4. North Arrow
5. Full Station and Offset. If more than one centerline, state which centerline information is taken from or provide general note.
6. Label all Points that determine the required right-of-way with a point number, used only once for each coordinate point.
7. Survey Centerline with Bearings (labeled)
8. Construction Centerline with Bearing (labeled)
9. Street Names (including Mainline, State Route, and U.S. Number)
10. Construction Limits (labeled or provide legend)
11. Existing Right-of-Way and Existing L/A marked, if any
12. Required Right-of-Way marked and Required L/A marked if any
13. Curve Data
14. BLA and ELA at access break points
15. Dual Project Plans clearly shown begin/end project
16. Title Block (upper and lower right - all sheets numbered, initialled and dated with date of completion)
17. Legend for L/A, Required Right-of-Way, Property Lines, Existing Right-of-Way, Easements, and any other symbols used in the plans
18. Angles and Stations where Centerline crosses streets
19. Edge of Pavement on Mainline, Cross Road and Drives
20. Equality Stations (if any)
21. Any Utility Relocation
22. Drainage (especially side drains and cross drains)
23. Driveways - Tie-ins and Streets
24. Dual County Projects - County pertaining to individual sheet
25. Sheets may overlay (for clarity of parcels)

D. INDIVIDUAL PROPERTY (PARCELS)

1. Station and offsets at all points (existing and required).

2. Metes and bounds on all lines and arcs defining required right-of-way and permanent drainage easements.
3. Area for required right-of-way (square feet and acres).
4. Remainder (parcel with required right-of-way crossing center should have total required right-of-way areas shown with a remainder left of and right of centerline).
5. Easement Labeled, including Driveways (station and offset points required; hatch construction easements, cross-hatch driveway easements).
6. Easement Area in Square Feet for all easement types, including driveway easements.
7. Project Parcel Number, address and Tax Map reference number on all sheets for each parcel, and address for each property adjacent to the project even if there is no acquisition.
8. Owner on all sheets applicable.
9. Buildings labeled
10. Access Rights
11. Access Breaks (also show dimension of Access Breaks and Driveways).
12. Signs and fences.
13. Gas Island, Pump Tanks and Permanent Light Fixtures at Service Stations.
14. Reference parcel number to sheet(s) necessary to cover the entire parcel shown in plans
15. All trees 12” in diameter and larger within the project limits
16. Any landscape islands and/or ornamental planting areas within the database

Requirements For Exhibit Plats

When required in addition to ROW plans, exhibit plats shall be prepared for each individual parcel involving required right-of-way and/or required easements necessary to construct the project. These plats shall be for the County's use in preparing legal deed descriptions and agreements for right-of-way acquisition. The scale for exhibit plats shall be the same as the right-of-way plans.

The plat size shall be 8-1/2" x 14"or 8-1/2" x 11", as requested by the County, and shall include the following:

A. Station and offsets at all points
B. Metes and bounds defining required right-of-way and permanent easements
C. North arrow
D. Area for required right-of-way
E. Easements labeled (construction, drainage, utility, guardrail, driveways, others as directed by GCDOT)
F. Easement areas in square feet
G. Parcel number
H. Owner
I. Building labeled
J. Access rights
K. Access breaks (also show dimension of access breaks and driveways)
L. Signs, fences
M. Gas islands, pump tanks, and permanent light fixtures at service stations, any improvements
N. Scale

O. Sealed by a registered land surveyor in the State of Georgia
P. Sources of property information (i.e., field surveys, tax maps, deed book number and page number)
Q. Land lot and tax map parcel numbers.

CHAPTER 25

QUALITY ASSURANCE

General

This chapter outlines the sequence of contract plans preparation and assembly, the review process, and the information required to be presented on the various plan sheets at various submittal phases.

The design engineer shall conduct a quality assurance (Q.A.) review of all documents prior to submitting the documents to the County. The quality assurance review shall be conducted by an in-house engineer, who preferably, has not been active in the project design. The Q.A. review shall include, as a minimum, the following activities:

Compliance with project requirements and criteria
Compliance with plans preparation procedures
Technical accuracy and adequacy
Compatibility with other associated project documents

Complete quality assurance reviews are required for the preliminary plans, 90% final plans and preliminary and final right-of-way plan submittals. A quality assurance review shall be performed to check quantities and compliance with 90% review comments for the final construction plans submittal. All plan submittals will be checked prior to submission to the County. The plans will be checked for conformance with the Gwinnett County Department of Transportation's "Roadway Plan Preparation Guidelines", legibility, and mathematical and plotting accuracy. Prior to submission of review documents to the County, the design engineer shall ensure that submittals meet all completeness requirements and directives set by the Gwinnett County Department of Transportation.

Checklists for each phase review are located elsewhere in this chapter. Checklists are considered to be minimum criteria, additional notes or text may be required to adequately interpret the plans. The checklists should be completed and submitted with the plans. For 90% and final plans, the designer must also submit a written response to County comments.

The design engineer's checking and reviewing process shall as a minimum include checking and backchecking.

Checking

A. The checker (someone other than the Designer) shall examine the check print prepared by the Designer.

B. The checker shall highlight in yellow on the check print each part that is correct and mark in red on the check print the required corrections (additions or deletions).

C. The checker shall initial and date the check print and forward the check print to the backchecker.

Backchecking

A. The backchecker (usually the Designer) shall review the checker's marks on the check print.

B. The backchecker shall consult with the checker if he does not agree with the redlined changes.

C. The backchecker shall update the document original to include the agreed changes.

D. The backchecker shall compare the updated original with the check print and circle in green on the check print each part that has been properly updated.

E. The backchecker shall sign and date the check print that all changes have been incorporated into document originals.

The design engineer will submit one complete set of prints of all plan sheets which have been subjected to review, which demonstrates that all items were checked, with each sheet initialed and dated by the reviewer.

Design calculations shall be submitted with the plans for each formal phase review. The submittal will not be considered complete and the formal County review will not begin until the design calculations are received by the County. Quality assurance checklists should be submitted with plans and calculations. Failure to submit the quality assurance checklist will result in the submittal being rejected by the County.

QUALITY ASSURANCE CHECKLIST
DATA BASE PREPARATION

___ EXISTING PROPERTY LINES
___ PROPERTY OWNERS
___ PLATS & DEEDS FOR ALL PROPERTY OWNERS AFFECTED BY THE PROJECT
___ LOCATION, TOP ELEVATION AND INVERT ELEVATIONS OF ALL EXISTING DRAINAGE STRUCTURES
___ SIZE OF ALL EXISTING BOX CULVERTS AND PIPES
___ DRAINAGE AREA SURVEY (AS REQUIRED)
___ LOCATE AND IDENTIFY ALL KNOWN UTILITY FACILITIES
___ ESTABLISH SURVEY CENTERLINES (BASELINES) FOR ALL ROADWAYS
___ STATION SURVEY CENTERLINES (PAINTING), BACK OF CURB, FACE OF CURB EDGE OF PAVEMENT, STRIPING
___ BUILDINGS AND ACCESSORY STRUCTURES – SIGNS, LIGHTING, FENCES APPURTENANCES
___ PROFILE ALL ROADWAYS AND DRIVEWAYS
___ CROSS SECTIONS
___ MONUMENTATION AND CONTROL

BASE PLAN SHEETS:

___ EXISTING ROAD CENTERLINES, BACK OF CURB, FACE OF CURB, EDGE OF PAVEMENT, STRIPING
___ EXISTING RIGHT-OF-WAY AND LIMITS OF ACCESS
___ EXISTING PROPERTY CORNERS
___ EXISTING PROPERTY LINES
___ PROPERTY OWNERS
___ SURVEY CONTROL POINTS
___ EXISTING DRAINAGE
___ EXISTING TOPOGRAPHY
___ EXISTING PROFILES
___ EXISTING STRUCTURES
___ TREES 12” AND LARGER
___ EXISTING SIGNS (SUBDIVISION, COMMERCIAL, ETC.)
___ EXISTING FENCES, LIGHTING, APPURTENANCES

QUALITY ASSURANCE CHECKLIST
(TO BE SUBMITTED WITH PRELIMINARY PLANS)

1. COVER SHEET

___ LOCATION MAP – SHOW SURROUNDING AREA
___ NORTH ARROW
___ GRAPHIC SCALE
___ PROJECT TITLE AND PROJECT NUMBER
___ LENGTH OF PROJECT BOX
___ NEW ASSET TYPE AND QUANTITY BOX (NET LENGTH OF NEW GUARDRAIL, SIDEWALK, TRAVEL LANES, TURN LANES, CURB AND GUTTER, ETC.)
___ DESIGN DATA (ADT, %TRUCKS, DESIGN AND POSTED SPEED, ROADWAY CLASSIFICATIONS)
___ PROJECT CENTERLINE, BEGIN AND END PROJECT STATIONS, TOPOGRAPHY, PROPERTY LINES, PARCEL NUMBERS, REQUIRED ROW AND EASEMENTS
___ PLAN SHEET OUTLINE
___ SIGHT DISTANCE CERTIFICATION FOR ROADS AND DRIVEWAYS

2. INDEX

___ DRAWING NUMBERS
___ DESCRIPTIONS
___ APPROPRIATE GEORGIA DEPARTMENT OF TRANSPORTATION STANDARDS LISTED WITH CURRENT DATE
___ APPROPRIATE CONSTRUCTION DETAILS LISTED WITH CURRENT DATE
___ GDOT STANDARDS/CONSTRUCTION DETAILS UP TO DATE
___ REVISION SUMMARY SHEET

3. GENERAL NOTES AND LEGEND

___ ALL UTILITIES WITH UTILITY CONTACT NUMBERS
___ ALL APPLICABLE NOTES THAT ARE NOT COVERED IN STANDARD SPECIFICATIONS
___ ALL SYMBOLS AND HATCHING WITH DESCRIPTION
___ IF PROJECT IS LOCATED ON A STATE ROUTE ADD GDOT ENCROACHMENT PERMITTING GENERAL NOTES

4. TYPICAL SECTIONS

___ STATION RANGE(S)
___ GRASSING DETAILS
___ CLASS B WIDENING DETAIL (IF NECESSARY)

___ TEMPLATE DIMENSIONS
___ PAVEMENT MATERIALS AND THICKNESSES
___ SLOPES - PAVEMENT, MEDIAN, SHOULDER, CUT AND FILL
___ GUARDRAIL DETAIL

5. TRAFFIC FLOW DIAGRAM

___ REQUIRED FOR LARGE PROJECTS WITH INTERSECTIONS
___ SHOW ADT AND TURNING MOVEMENT(S) FOR OPENING AND DESIGN YEAR
___ SHOW AM AND PM PEAK HOUR MOVEMENTS

6. CONSTRUCTION LAYOUT/STAKEOUT SHEET (MAY BE OMITTED FOR SMALL PROJECTS)

___ CONTROL POINTS (WITH X, Y, AND Z COORDINATES TO 4 DECIMALS
___ CENTERLINE COORDINATES AND CURVE DATA TO 4 DECIMALS
___ ANGLES AND INTERSECTION EQUALITIES

7. PLAN SHEETS

___ BASE PLAN SHEET INFORMATION
___ EXISTING TOPOGRAPHY AND PLANIMETRICS (DASHED)
___ EXISTING RIGHT-OF-WAY, EASEMENTS AND LIMITS OF ACCESS
___ PROPERTY LINES, OWNER’S NAME, TAX ID, PARCEL NUMBER AND ADDRESS
___ LAND LOT LINES AND NUMBERS
___ CONSTRUCTION CENTERLINE AND STATIONING
___ CURVE DATA
___ PROPOSED EDGE OF PAVEMENT, PAVED SHOULDERS, CURBS AND GUTTER, SIDEWALK, MEDIANS, ISLANDS, ETC.
___ PROPOSED RIGHT-OF-WAY AND LIMITS OF ACCESS
___ PROPOSED EASEMENTS
___ PROPOSED GUARDRAIL & ANCHORAGE (TYPE)
___ PROPOSED STRAIN POLE LOCATIONS
___ LABEL BEGIN AND END OF PROJECT, SIDEWALK, CURB AND GUTTER, GUARDRAIL, APPROACH SLABS, WALLS, BRIDGES AND EXCEPTIONS
___ LABEL P.C.'S AND P.T.'S OF CURVES
___ PLACE 100' AND 50' TICK MARKS
___ LABEL 100' TICK MARKS
___ LABEL CROSS STREETS
___ MATCH LINES
___ NORTH ARROW
___ GRAPHIC SCALE
___ TITLE BLOCK
___ DRAWING NUMBERS
___ PROJECT NUMBER

___ STATION EQUATIONS
___ ANGLES AND INTERSECTION EQUALITIES
___ STATION AND OFFSET CURB RADIUS RETURNS AND DIMENSION RADII
___ MEDIAN OPENINGS
___ PAVEMENT DIMENSIONS
___ FLARES AND TAPERS (BEGIN AND END)
___ SUPERELEVATIONS (LABELED ON PLANS)
___ RIGHT-OF-WAY TIES
___ CONSTRUCTION LIMITS
___ MAJOR DRAINAGE AND RIGHT-OF-WAY BLOCKOUTS
___ LIMITS OF CROSS STREET CONSTRUCTION
___ CONTROL POINTS (WITH X, Y, AND Z COORDINATES TO 4 DECIMALS)
___ APPROACH SLABS
___ SPECIAL GRADING

DRAINAGE

___ MAJOR CULVERTS (LOCATION AND SIZE)
___ CULVERT END TREATMENTS AND EROSION PROTECTION (FOR RIP RAP SHOW TYPE, AREA AND DEPTH)
___ CATCH BASINS-DROP INLETS (LOCATION AND TYPE)
___ SIDE DRAIN PIPES
___ DRAINAGE DITCHES LABELED AT BEGIN AND END STATIONS
___ DITCH LININGS (CONCRETE AND RIP RAP) LABELED AT BEGIN AND END STATIONS

8. ROADWAY, CROSSROAD AND DRIVEWAY PROFILES

___ ROAD NAMES
___ BEGIN AND END PROJECT STATIONS
___ BEGIN AND END BRIDGE STATIONS
___ PVC, PVT, PVI AND K OF VERTICAL CURVES
___ VERTICAL CURVE DATA
___ EQUALITIES
___ EXISTING AND PROPOSED GROUNDLINES
___ EXISTING AND PROPOSED ELEVATIONS
___ GRADES BETWEEN PVI'S
___ VERTICAL ELEVATION DATUM
___ LARGE UTILITY CROSSINGS
___ LARGE DRAINAGE CROSSINGS
___ INTERSECTION STATIONS AND ELEVATIONS

9. MAINTENANCE OF TRAFFIC PLAN

___ PLAN SHEET(S) SHOWING EXISTING AND PROPOSED STAGE CONSTRUCTION

___ CONSTRUCTION NARRATIVE
___ CROSS SECTIONS FOR EACH STAGE
___ EARTHWORK BY STAGE
___ TEMPORARY SIGNING AND MARKING PLANS
___ TEMPORARY DRAINAGE
___ LEGEND (SEE STANDARD LEGEND)
___ CHANNELIZING DEVICES
___ TEMPORARY BARRICADES

10. DRAINAGE AREA MAP

___ PROJECT CENTERLINE WITH STATIONING
___ EXISTING ROADS AND STREETS SHOWN AND LABELED
___ EXISTING CULVERTS AND DATA (AREAS, FLOWS, ETC.)
___ RIDGE LINES AND DIRECTION OF FLOW
___ DRAINAGE AREAS
___ NORTH ARROW AND GRAPHIC SCALE
___ PROPOSED CULVERTS AND DATA (AREAS, FLOWS, ETC.)
___ STREAMS, LAKES AND BUFFERS SHOWN AND LABELED
___ TOTAL DISTURBED AREA

11. DRAINAGE PROFILES

___ LOCATION OF STRUCTURES - STATION AND OFFSET
___ STRUCTURE NUMBER AND TYPE
___ STRUCTURE HEIGHT
___ INVERT ELEVATIONS
___ LENGTH OF STRUCTURE - MEASURED ALONG CENTERLINE
___ SLOPE OF STRUCTURE
___ LOCATION OF EXISTING UTILITIES (HORIZONTAL AND VERTICAL)
___ EXISTING GROUND LINES AT PIPE INLETS AND OUTLETS WHEN PICKING UP OR DRAINING TO NATURAL GROUND
___ PROPOSED DITCH LINES AT PIPE INLETS AND OUTLETS WHEN PICKING UP OR DRAINING TO A NEW DITCH
___ PROPOSED RIP RAP EMBEDDED AT OUTFALLS

12. CROSS SECTIONS

___ MAINLINE
___ CROSS STREETS
___ STAGE CONSTRUCTION
___ HORIZONTAL AND VERTICAL SCALE – 1”=10’
___ EXISTING GROUNDLINE
___ PROPOSED TEMPLATE (FINISH GRADE AND SUBGRADE)
___ PROFILE GRADE ELEVATION

___ EXISTING GROUND ELEVATION AT THE PROPOSED CENTERLINE
___ CENTERLINE LABEL
___ LABEL EXISTING AND PROPOSED ROW AND EASEMENTS
___ STATION NUMBERS
___ DITCHES SHOWN WITH DITCH ELEVATION
___ UNDERGROUND UTILITIES
___ LABEL SLOPE RATIO FOR ALL SLOPES THAT ARE NOT TYPICAL

13. UTILITY PLANS

___ LEGEND (SEE STANDARD LEGEND)
___ EXISTING TOPOGRAPHY, PLANIMETRICS, ROW AND EASEMENTS
___ PROPOSED PLANIMETRICS AND CURVE DATA
___ EXISTING AND PROPOSED DRAINAGE
___ EXISTING UTILITIES AS KNOWN (AERIAL AND UNDERGROUND)
___ PROPOSED STRAIN POLES
___ PROPERTY ADDRESSES

14. BRIDGE PLAN AND ELEVATION SHEET

___ PRELIMINARY PLAN AND ELEVATION

15. PRELIMINARY WALL LAYOUT

___ BEGIN/END WALL STATIONS AND ELEVATIONS
___ STATION, OFFSET, AND ELEVATION AT ALL BREAKPOINTS
___ FOOTING ELEVATIONS
___ EXISTING GROUND
___ PROPOSED GRADE
___ RIGHT-OF-WAY
___ UTILITIES
___ FOOTING ELEVATIONS

16. SIGNING AND MARKING PLANS

___ SIGNING AND MARKING GENERAL NOTES
___ PROPOSED ROW AND EASEMENTS
___ LANE DESIGNATIONS – PAVEMENT MARKINGS
___ CROSSWALKS, SIDEWALKS AND HANDICAP RAMPS
___ GUARDRAIL
___ SCHOOL FLASHERS (IF REQUIRED)
___ STRIPING, STOP BARS TURNING ARROWS AND HATCHING
___ SIGNING (REPLACE DISTURBED SIGNS WITH NEW EXCEPT FOR SPECIALTY SIGNS)
___ RAISED PAVEMENT MARKERS

___ PROPOSED STRAIN POLES FOR SIGNALS, SCHOOL FLASHERS AND OVERHEAD SIGNS
___ STREET NAME SIGNS

17. SIGNAL PLANS

___ GENERAL NOTES
___ NORTH ARROW
___ GRAPHIC SCALE
___ ROADWAY GEOMETRICS
___ INTERSECTION EQUALITY STATIONS
___ UTILITIES
___ LIGHTING
___ DRAINAGE
___ SIGNAL POLE/MAST ARM LOCATIONS
___ TYPE AND LOCATION OF LOOPS
___ TYPE AND LOCATION OF SIGNAL HEADS
___ TYPE AND LOCATION OF CONTROLLERS, PULL BOXES AND CONDUIT
___ PEDESTRIAN SIGNAL (IF REQUIRED)
___ STOP BARS
___ CROSS WALKS
___ STRIPING
___ SIGNAL PHASING
___ SIGNS
___ LIST OF MATERIALS
___ PAY ITEMS
___ DETAILS AND SUMMARY OF QUANTITIES FOR OVERHEAD SIGNS

18. WATER & SEWER

___ EXISTING WATER AND SEWER FACILITIES (HYDRANTS, METERS, VALVES, VALVE MARKERS, AIR RELEASE VALVES, BLOW OFF VALVES, HOUSE SERVICE CONNECTIONS, ETC.)
___ EXISTING WATER AND SEWER LINES WITH SIZE, TYPE AND MATERIAL
___ PROPOSED WATER AND SEWER FACILITIES (HYDRANTS, METERS, VALVES, VALVE MARKERS, AIR RELEASE VALVES, BLOW OFF VALVES, HOUSE SERVICE CONNECTIONS, ETC.)
___ PROPOSED WATER AND SEWER LINES WITH SIZE, TYPE AND MATERIAL

19. EROSION CONTROL

___ CURRENT ESPC PLAN CHECKLIST COMPLETE AND INSERTED IN PLANS
___ PARCEL NUMBERS
___ EASEMENTS AND ROW CONSISTENT WITH ROW PLANS AND CONSTRUCTION PLANS

___ WATER QUALITY MONITORING (IF REQUIRED)
___ 3 STAGE PLANS (IF REQUIRED)
___ SEDIMENT PONDS
___ BMP’S, TYPE, SIZE AND LOCATION
___ RIP-RAP, TYPE, SIZE, AREA AND LOCATION
___ PIPE DIAMETERS

QUALITY ASSURANCE CHECKLIST
(TO BE SUBMITTED WITH RIGHT-OF-WAY PLANS)

1. FINAL RIGHT-OF-WAY PLANS CHECKLIST

___ TITLE BLOCK
___ LEGEND
___ NORTH ARROW AND SCALE
___ STREET NAMES
___ SURVEY BASELINE AND CONSTRUCTION CENTERLINE (IF APPLICABLE)
___ EXISTING RIGHT-OF-WAY, EASEMENTS AND LIMITS OF ACCESS MARKED
___ PROPERTY LINES
___ PARCEL NUMBERS, PARCEL IDENTIFICATION NUMBER (PIN), ADDRESSES AND OWNER’S NAMES
___ LAND LOT NUMBERS AND LINES
___ LAND DISTRICT NUMBERS AND LINES
___ CONSTRUCTION CENTERLINE
___ CENTERLINE STATION EQUATIONS
___ CURVE DATA
___ ANGLES AND INTERSECTION EQUALITIES
___ PARALLEL FIGURES – EDGE OF PAVEMENT, CURB AND GUTTER, ETC.
___ REQUIRED RIGHT-OF-WAY AND LIMITS OF ACCESS
___ BEGIN AND END LIMITS OF ACCESS (BLA AND ELA)
___ CONSTRUCTION LIMITS
___ CONSTRUCTION EASEMENTS (HATCHED BY TYPE)
___ DRIVEWAY EASEMENTS (CROSS HATCHED)
___ STATIONS AND OFFSETS FOR BREAK POINTS IN RIGHT-OF-WAY AND EASEMENT
___ BEARINGS AND DISTANCES ON DATA TABLES (NOT REQUIRED ON EXISTING)
___ ARC LENGTH AND RADIUS ON CURVED LINES
___ DRAINAGE STRUCTURES - SIDE DRAINS, CROSS DRAINS AND CHANNEL CHANGES
___ BEGIN AND END RIGHT-OF-WAY ACQUISITION
___ LIMITS OF RIGHT-OF-WAY ACQUISITION FOR CROSS STREETS
___ REQUIRED RIGHT-OF-WAY AND EASEMENT AREA
___ REMAINING AREAS LEFT AND RIGHT OF CENTERLINE
___ SIGNS, PUMP ISLANDS, FENCES AND LIGHT FIXTURES WITHIN REQUIRED RIGHT-OF-WAY LOCATED AND ANNOTATED
___ BUILDINGS SHOWN AND LABELED
___ PROVIDE TWO COORDINATES PER PLAN SHEET BASED ON THE BASELINE

2. DATA SHEET

___ BREAK POINTS WITH DISTANCE AND BEARING FOR ROW AND EASEMENT AREAS
___ TOTAL AREA OF ROW AND EASEMENT IN SQUARE FEET AND ACRES AND REMAINDER FOR EACH PARCEL
___ TOTAL AREA OF DRIVEWAY EASEMENT IN SQUARE FEET AND ACRES

___ STATION AND OFFSET FOR EACH POINT
___ R/W AND EASEMENT CHAINS DESCRIBED CLOCKWISE

QUALITY ASSURANCE CHECKLIST
(TO BE SUBMITTED WITH 90% AND FINAL PLANS)

GENERAL

___ ALL SHEETS ARE NUMBERED AND TOTALED

1. COVER SHEET

___ LOCATION MAP – SHOW SURROUNDING AREA
___ NORTH ARROW
___ GRAPHIC SCALE
___ PROJECT TITLE AND PROJECT NUMBER
___ LENGTH OF PROJECT BOX
___ NEW ASSET TYPE AND QUANTITY BOX (NET LENGTH OF NEW GUARDRAIL, SIDEWALK, TRAVEL LANES, TURN LANES, CURB AND GUTTER, ETC.
___ DESIGN DATA (ADT, %TRUCKS, DESIGN AND POSTED SPEED, ROADWAY CLASSIFICATIONS)
___ PROJECT CENTERLINE, BEGIN AND END PROJECT STATIONS, TOPOGRAPHY, PROPERTY LINES, PARCEL NUMBERS, REQUIRED ROW AND EASEMENTS.
___ PLAN SHEET OUTLINE
___ SIGHT DISTANCE CERTIFICATION FOR ROADS AND DRIVEWAYS
___ SEAL AND SIGNATURE OF THE DESIGN ENGINEER OF RECORD

2. INDEX

___ DRAWING NUMBERS
___ DESCRIPTIONS
___ SHEET NUMBERS
___ APPROPRIATE GEORGIA DEPARTMENT OF TRANSPORTATION STANDARDS LISTED WITH CURRENT DATE
___ APPROPRIATE CONSTRUCTION DETAILS LISTED WITH CURRENT DATE
___ GDOT STANDARDS/CONSTRUCTION DETAILS UP TO DATE
___ REVISION SUMMARY SHEET

3. GENERAL NOTES AND LEGEND

___ ALL UTILITIES AND UTILITY CONTACT NUMBERS
___ ALL APPLICABLE NOTES THAT ARE NOT COVERED IN STANDARD SPECIFICATIONS
___ ALL SYMBOLS AND HATCHING WITH DESCRIPTIONS
___ IF PROJECT IS LOCATED ON A STATE ROUTE ADD GDOT ENCROACHMENT PERMITTING GENERAL NOTES

4. TYPICAL SECTIONS

___ STATION RANGE(S)
___ GRASSING DETAILS
___ CLASS B WIDENING DETAIL (IF NECESSARY)
___ TEMPLATE DIMENSIONS
___ PAVEMENT MATERIALS AND THICKNESSES
___ SLOPES - PAVEMENT, MEDIAN, SHOULDER, CUT AND FILL
___ GUARDRAIL DETAIL

5. SUMMARY OF QUANTITIES

___ EARTHWORK (FOR INFORMATION ONLY)
___ DRAINAGE (INCLUDING BOX/BRIDGE CULVERTS)
___ SIGNING
___ DRIVEWAYS

6. DETAILED ESTIMATE

___ BID ITEM NUMBERS (IF MULTIPLE ITEMS OF THE SAME NUMBER ARE USED, ADD A, B, C, ETC.)
___ ITEM DESCRIPTIONS
___ UNITS
___ QUANTITIES (IF MORE THAN ONE PROJECT, BREAK OUT QUANTITIES BY PROJECT AND ADD TOTAL COLUMN)

7. TRAFFIC FLOW DIAGRAM

___ REQUIRED FOR LARGE PROJECTS WITH INTERSECTIONS
___ SHOW ADT AND TURNING MOVEMENT(S) FOR OPENING AND DESIGN YEAR
___ SHOW AM AND PM PEAK HOUR MOVEMENTS

8. CONSTRUCTION LAYOUT/STAKEOUT SHEET (MAY BE OMITTED FOR SMALL PROJECTS)

___ CONTROL POINTS (WITH X, Y, AND Z COORDINATES TO 4 DECIMALS
___ CENTERLINE COORDINATES AND CURVE DATA TO 4 DECIMALS
___ ANGLES AND INTERSECTION EQUALITIES

9. PLAN SHEETS

___ BASE PLAN SHEET INFORMATION
___ EXISTING TOPOGRAPHY AND PLANIMETRICS (DASHED)
___ EXISTING RIGHT-OF-WAY, EASEMENTS AND LIMITS OF ACCESS
___ PROPERTY LINES, OWNER'S NAME, PARCEL NUMBER, TAX ID AND ADDRESS
___ LAND LOT LINES AND NUMBERS
___ CONSTRUCTION CENTERLINE AND STATIONING
___ CURVE DATA
___ PROPOSED EDGES OF PAVEMENT, PAVED SHOULDERS, CURB AND GUTTER, SIDEWALK, MEDIANS, ISLANDS, ETC..
___ PROPOSED RIGHT-OF-WAY AND LIMITS OF ACCESS
___ PROPOSED EASEMENTS
___ PROPOSED GUARDRAIL AND ANCHORAGE TYPE
___ PROPOSED STRAIN POLE LOCATIONS
___ LABEL BEGIN AND END OF PROJECT, SIDEWALK, CURB AND GUTTER, GUARDRAIL, WALLS, APPROACH SLABS,BRIDGES AND EXCEPTIONS
___ LABEL P.C.'S AND P.T.'S OF CURVES
___ PLACE 100' AND 50' TICK MARKS
___ LABEL 100' TICK MARKS
___ LABEL CROSS STREETS
___ MATCH LINES
___ NORTH ARROW
___ GRAPHIC SCALE
___ TITLE BLOCK
___ DRAWING NUMBERS
___ PROJECT NUMBER
___ STATION EQUATIONS
___ ANGLES AND INTERSECTION EQUALITIES
___ INTERSECTION DETAILS
___ STATION AND OFFSET CURB RADIUS RETURNS AND DIMENTION RADII
___ MEDIAN OPENINGS
___ PAVEMENT DIMENSIONS
___ FLARES AND TAPERS (BEGIN AND END)
___ SUPERELEVATIONS (LABELED ON PLANS)
___ RIGHT-OF-WAY TIES
___ CONSTRUCTION LIMITS
___ MAJOR DRAINAGE AND RIGHT-OF-WAY BLOCKOUTS
___ LIMITS OF CROSS STREET CONSTRUCTION
___ CONTROL POINTS (WITH X, Y, AND Z COORDINATES TO 4 DECIMALS)
___ APPROACH SLABS
___ SPECIAL GRADING

DRAINAGE

___ MAJOR CULVERTS (LOCATION AND SIZE)
___ CULVERT END TREATMENTS AND EROSION PROTECTION (FOR RIP RAP SHOW TYPE, AREA AND DEPTH)
___ CATCH BASINS-DROP INLETS (LOCATION AND TYPE)
___ SIDE DRAIN PIPES
___ DRAINAGE DITCHES LABELED AT BEGIN AND END STATIONS
___ DITCH LININGS (CONCRETE AND RIP RAP) LABELED AT BEGIN AND END STATIONS

10. ROADWAY, CROSSROAD AND DRIVEWAY PROFILES

___ ROAD NAMES
___ BEGIN AND END PROJECT STATIONS
___ BEGIN AND END BRIDGE STATIONS
___ PVC, PVT, PVI AND K OF VERTICAL CURVES
___ VERTICAL CURVE DATA
___ EQUALITIES
___ EXISTING AND PROPOSED GROUNDLINES
___ EXISTING AND PROPOSED ELEVATIONS
___ GRADES BETWEEN PVI'S
___ VERTICAL ELEVATION DATUM
___ LARGE UTILITY CROSSINGS
___ LARGE DRAINAGE CROSSINGS
___ INTERSECTION STATIONS AND ELEVATIONS

11. MAINTENANCE OF TRAFFIC PLAN

___ PLAN SHEET(S) SHOWING EXISTING AND PROPOSED STAGE CONSTRUCTION
___ CONSTRUCTION NARRATIVE
___ CROSS SECTIONS FOR EACH STAGE
___ EARTHWORK BY STAGE
___ TEMPORARY SIGNING AND MARKING PLANS
___ TEMPORARY DRAINAGE
___ LEGEND (SEE STANDARD LEGEND)
___ CHANNELIZING DEVICES
___ TEMPORARY BARRICADES

12. DRAINAGE AREA MAP

___ PROJECT CENTERLINE WITH STATIONING
___ EXISTING ROADS AND STREETS SHOWN AND LABELED
___ EXISTING CULVERTS AND DATA (AREAS, FLOWS, ETC.)
___ RIDGE LINES AND DIRECTION OF FLOW

___ DRAINAGE AREAS
___ NORTH ARROW AND GRAPHIC SCALE
___ PROPOSED CULVERTS AND DATA (AREAS, FLOWS, ETC.)
___ STREAMS, LAKES AND BUFFERS SHOWN AND LABELED
___ TOTAL PROJECT AREA
___ TOTAL DISTURBED AREA

13. DRAINAGE PROFILES

___ LOCATION OF STRUCTURES - STATION AND OFFSET
___ STRUCTURE NUMBER AND TYPE
___ STRUCTURE HEIGHT
___ INVERT ELEVATIONS
___ LENGTH OF STRUCTURE - MEASURED ALONG CENTERLINE
___ SLOPE OF PIPE/CULVERT
___ LOCATION OF EXISTING UTILITIES (HORIZONTAL AND VERTICAL)
___ EXISTING GROUND LINES AT PIPE INLETS AND OUTLETS WHEN PICKING UP OR DRAINING TO NATURAL GROUND
___ PROPOSED DITCH LINES AT PIPE INLETS AND OUTLETS WHEN PICKING UP OR DRAINING TO A NEW DITCH
___ PROPOSED RIP RAP EMBEDDED AT OUTFALLS

14. CROSS SECTIONS

___ MAINLINE
___ CROSS STREETS
___ STAGE CONSTRUCTION
___ HORIZONTAL AND VERTICAL SCALE – 1”=10’
___ EXISTING GROUND LINE
___ PROPOSED TEMPLATE (FINISH GRADE AND SUBGRADE)
___ PROFILE GRADE ELEVATION
___ EXISTING GROUND ELEVATION AT THE PROPOSED CENTERLINE
___ CENTERLINE LABEL
___ LABEL EXISTING AND PROPOSED ROW AND EASEMENTS
___ STATION NUMBERS
___ DITCHES SHOWN WITH DITCH ELEVATION
___ UNDERGROUND UTILITIES
___ LABEL SLOPE RATIO FOR ALL SLOPES THAT ARE NOT TYPICAL

15. UTILITY PLANS

___ LEGEND (SEE STANDARD LEGEND)
___ EXISTING TOPOGRAPHY, PLANIMETRICS, ROW AND EASEMENTS
___ PROPOSED PLANIMETRICS AND CURVE DATA
___ EXISTING AND PROPOSED DRAINAGE

___ EXISTING AND RELOCATED GAS
___ EXISTING AND RELOCATED POWER
___ EXISTING AND RELOCATED WATER AND SEWER
___ EXISTING AND RELOCATED TELEPHONE
___ EXISTING AND RELOCATED CABLE TELEVISION
___ EXISTING AND PROPOSED DRAINAGE STRUCTURES
___ UTILITIES ON BRIDGES
___ PROPOSED STRAIN POLES
___ PROPERTY ADDRESSES

16. SIGNING AND MARKING PLANS

___ SIGNING AND MARKING GENERAL NOTES
___ PROPOSED ROW AND EASEMENTS
___ LANE DESIGNATIONS - PAVEMENT MARKINGS
___ CROSSWALKS, SIDEWALKS AND HANDICAP RAMPS
___ GUARDRAIL
___ SCHOOL FLASHERS (IF REQUIRED)
___ STRIPING, STOP BARS , TURNING ARROWS AND HATCHING
___ SIGNING (REPLACE DISTURBED SIGNS WITH NEW EXCEPT SPECIALTY SIGNS)
___ RAISED PAVEMENT MARKERS
___ STREET NAME SIGNS
___ PROPOSED STRAIN POLES FOR SIGNALS, SCHOOL FLASHERS AND OVERHEAD SIGNS

17. SIGNALIZATION PLANS

___ GENERAL NOTES
___ NORTH ARROW
___ GRAPHIC SCALE
___ ROADWAY GEOMETRICS
___ INTERSECTION EQUALITY STATIONS
___ UTILITIES
___ LIGHTING
___ DRAINAGE
___ SIGNAL POLE/MAST ARM LOCATIONS
___ TYPE AND LOCATION OF LOOPS
___ TYPE AND LOCATION OF SIGNAL HEADS
___ TYPE AND LOCATION OF CONTROLLERS, PULL BOXES AND CONDUIT
___ PEDESTRIAN SIGNAL (IF REQUIRED)
___ STOP BARS
___ CROSS WALKS
___ STRIPING
___ SIGNAL PHASING
___ SIGNS

___ LIST OF MATERIALS
___ PAY ITEMS
___ DETAILS AND SUMMARY OF QUANTITIES FOR OVERHEAD SIGNS

18. INTERSECTION DETAILS (IF REQUIRED)

___ NORTH ARROW
___ GRAPHIC SCALE
___ ROADWAY GEOMETRICS
___ DIMENSIONS
___ RADII LABELED
___ OFFSETS
___ STATIONS ON RADIUS RETURNS
___ LIMITS OF CONSTRUCTION
___ DRAINAGE
___ UTILITIES
___ FLARES AND TAPERS
___ GRADING/CONTOURING OF PAVEMENT (IF REQUIRED)

19. MASS DIAGRAM

___ EARTHWORK FOR EACH STAGE CONSTRUCTION (IF APPLICABLE)
___ EARTHWORK FOR TOTAL PROJECT

20. CROSS SECTION PATTERN SHEET (INTERCHANGES)

___ SCALE
___ EXISTING GROUNDLINE
___ PROPOSED TEMPLATE (FINISH GRADE AND SUBGRADE)
___ PROFILE GRADE ELEVATION
___ CENTERLINE IDENTIFIABLE
___ STATION NUMBERS
___ DITCHES SHOWN (ELEVATIONS MAY BE REQUIRED FOR SPECIAL DITCHES)

21. BRIDGE PLANS

___ PLAN AND ELEVATION
___ DECK PLAN
___ DECK SECTION
___ BEARING ASSEMBLY
___ BEAM ELEVATION AND SECTION
___ MISCELLANEOUS BEAM
___ END BENTS
___ INTERMEDIATE BENTS
___ BAR BENDING DETAILS

___ SHORING, STAGE CONSTRUCTION
___ TABULATION OF QUANTITIES ON PLAN AND ELEVATION SHEET
___ DIMENSIONS SHOWN ON ALL SHEETS

22. WALL PLANS

___ BEGIN/END STATIONS
___ ELEVATIONS AT BEGIN, END, AND BREAK POINTS
___ EXISTING GROUND
___ PROPOSED GRADE
___ RIGHT-OF-WAY AND EASEMENT LIMITS
___ SUPERELEVATION DATA
___ STATIONS AND OFFSETS TO FACE OF WALL
___ NOISE WALL REQUIREMENTS (IF APPLICABLE)
___ OVERHEAD SIGNS
___ DRAINAGE
___ ROADWAY LIGHTING
___ SEQUENCE OF WALL CONSTRUCTION (IF REQUIRED)
___ LENGTH OF MESH AND PANEL DETAILS FOR EARTH TYPE WALLS
___ ELEVATION OF FOOTING OR LEVELING PAD SHOWN
___ TABLE OF QUANTITIES

23. WATER & SEWER

___ EXISTING WATER AND SEWER FACILITIES (HYDRANTS, METERS, VALVES, VALVE MARKERS, AIR RELEASE VALVES, BLOW OFF VALVES, HOUSE SERVICE CONNECTIONS, ETC.)
___ EXISTING WATER AND SEWER LINES WITH SIZE, TYPE AND MATERIAL
___ PROPOSED WATER AND SEWER FACILITIES (HYDRANTS, METERS, VALVES, VALVE MARKERS, AIR RELEASE VALVES, BLOW OFF VALVES, HOUSE SERVICE CONNECTIONS, ETC.)
___ PROPOSED WATER AND SEWER LINES WITH SIZE, TYPE AND MATERIAL

24. EROSION CONTROL

___ CURRENT ESPC PLAN CHECKLIST COMPLETE AND INSERTED IN PLANS
___ PARCEL NUMBERS
___ EASEMENTS AND ROW CONSISTENT WITH ROW PLANS AND CONSTRUCTION PLANS
___ WATER QUALITY MONITORING (IF REQUIRED)
___ 3 STAGE PLANS (IF REQUIRED)
___ SEDIMENT PONDS
___ BMP’S, TYPE, SIZE, AREA AND LOCATION
___ RIP-RAP, TYPE, SIZE AND LOCATION
___ PIPE DIAMETERS

APPENDIX A
GWINNETT COUNTY DEPARTMET OF WATER RESOURCES PAY ITEM LIST

Gwinnett County DWR Pay Item Index for Gwinnett County DOT Projects

Eroision Control, Landscapping, Concrete, and Pavement Restoration Items

Item #	Pay Item Number	DESCRIPTION	Unit
1	023219	**Exploratory Excavation**	HR
2	024211	**Debris Removal Per Truck**	EA
3		**Cast-in-Place Concrete -**	
	033000-A	Class A	CY
	033000-B	Class B	CY
4	311100	**Clearing and Grubbing**	ACRE
5	311311	**Orange Barrier Fence**	LF
6	312300-RE	**Rock Excavation**	CY
7	312300-CR	**Crusher Run Backfill**	TON
8		**Erosion and Sedimentation Control**	
	312500-PAM	Anionic Polyacrylamide	GAL
	312500-HB	Hay Bales	EA
	312500-IST	Inlet Sediment Trap	EA
	312500-MAT	Jute Matting or Excelsior Netting	SY
	312500-RCD	Rock Check Dam	EA
	312500-TYA	Silt Fence Type ‘A’	LF
	312500-TYC	Silt Fence Type ‘C’	LF
	312500-MUL	Dry Straw or Hay Mulch	LF
	312500-TSM	Temporary Seeding and Mulch	LF
9	313700	**Rip Rap**	SY
10	321216	**Asphalt Paving**	SY
11	321613-SW	**Sidewalk Restoration**	LF

12	321613-CG	**Curb/Combination Curb & Gutter Restoration**	LF
13	34411610	**Police Traffic Control**	HR
14		**Driveway Cut Restoration -**	
	347100-DC	Concrete	SY
	347100-DG	Gravel	SY
	347100-DA	Asphalt	SY
15		**Pavement Cut Restoration -**	
	347100-PA	Type A	SY
	347100-PB	Type B	SY
	347100-PC	Type C	SY
16	329200-PS	**Permanent Seeding**	LF
17	329200-SRR	**Sod Removal and Replacement**	LF
18	329200-TS	**Topsoil**	LF
19		**Tree Replacement -**	
	329343-H	Hardwoods, 2”	EA
	329343-P	Pines, 2”	EA
	329343-R	Riverside, 2”	EA

Water Items

17	330516.13-AV	**Adjust Water Vault**	VF
18		**Adjust Water Vault Top to Grade -**	
	330516.13-ATNP	1 Vertical ft. or less, Non-pavement	EA
	330516.13-ATP	1 Vertical ft. or less, pavement	EA
19	330516.13-ARM	**Air Release Manhole Vent Adjustment**	EA
20		**Furnish and Install Precast Concrete Vaults with Bilco Aluminum Hatches -**	
	330516.13-5V	5’x9’x6’ Vault	EA

	330516.13-12V	12’x6’x6’ Vault	EA
21	330516.13-AMVT	**Adjust /Modify Vault Top**	EA
22		**Steel Casing, Bore & Jack Installation -**	
	330523.16-8J	8” Diameter	LF
	330523.16-12J	12” Diameter	LF
	330523.16-16J	16” Diameter	LF
	330523.16-20J	20” Diameter	LF
	330523.16-24J	24” Diameter	LF
	330523.16-30J	30” Diameter	LF
	330523.16-36J	36” Diameter	LF
23		**Steel Casing, Open Cut Installation -**	
	330523.16-8O	8” Diameter	LF
	330523.16-12O	12” Diameter	LF
	330523.16-16O	16” Diameter	LF
	330523.16-20O	20” Diameter	LF
	330523.16-24O	24” Diameter	LF
	330523.16-30O	30” Diameter	LF
	330523.16-36O	36” Diameter	LF
24		**Uncased Boring, For Main Pipe Size -**	
	330523.16-4U	4” Diameter	LF
	330523.16-8U	8” Diameter	LF
	330523.16-10U	10” Diameter	LF
	330523.16-12U	12” Diameter	LF
	330523.16-16U	16” Diameter	LF
25	330523.71-48	**Steel Tunnel Liner 48” Diameter**	LF
26		**Ductile Iron Pipe -**	
	331113.05-4D	4” Diameter	LF
	331113.05-6D	6” Diameter	LF
	331113.05-8D	8” Diameter	LF
	331113.05-10D	10” Diameter	LF
	331113.05-12D	12” Diameter	LF
	331113.05-14D	14” Diameter	LF
	331113.05-16D	16” Diameter	LF
	331113.05-20D	20” Diameter	LF

	331113.05-24D	24” Diameter	LF
	331113.05-30D	30” Diameter	LF
	331113.05-36D	36” Diameter	LF
	331113.05-48D	48” Diameter	LF
	331113.05-54D	54” Diameter	LF
27	331113.05-UG	**Upgrade __" DIP to Pressure Class 350 pipe**	LF
28		**Lower Existing Ductile Iron Pipe in Place Materials, Labor and Equipment**	
	331113.05-6L	6” Diameter	LF
	33111305-8L	8” Diameter	LF
	331113.05-10L	10” Diameter	LF
	331113.05-12L	12” Diameter	LF
	331113.05-14L	14” Diameter	LF
	331113.05-16L	16” Diameter	LF
29	331113.05-PE	**Polyethylene Encasement**	LF
30		**Steel Pipe -**	
	331113.07-12S	12” Diameter	LF
	331113.07-24S	24” Diameter	LF
	331113.07-36S	36” Diameter	LF
	331113.07-48S	48” Diameter	LF
31		**Water Service Connections -**	
	331213-1LS	¾” – 1” Long Side Service Connections	EA
	331213-2LS	1 ½” – 2” Long Side Service Connection	EA
	331213-1SS	¾” – 1” Short Side Service Connection	EA
	331213-2SS	1 ½” – 2” Short Side Service Connections	EA
	331213-1ELS	¾” – 1” Extra long Service Line Installation > 5 lanes	EA
	331213-2ELS	1 ½” – 2” Extra long Service Line Installation > 5 lanes	EA
	331213-RM	Relocate Existing Meter	EA
	331213-LESL	Lower Existing Service Line	EA
	331213-SM	Salvage Meter	EA
	331213-A	Abandon Existing Service at Main	EA
	331213-AMB	Adjust Meter Box to Grade	EA

32		**Relocate Large Meters/Check Valves, Vaults, Complete (Labor, Equipment and Materials other than pipe and fittings) -**	
	331213-4LM	3” & 4” Meters	EA
	331213-8LM	6” & 8” Meters	EA
33	331213-CM	**Change Out Existing Meter, 5/8” to ¾”, Labor and Equipment**	EA
34		**Install Meter to Include: Assembly as necessary, Tap on Main, Service line from main to meter location and appropriate valves installed at meter and meter boxes. Gwinnett County to Furnish meters and boxes.**	
	331213-.75M	**¾” Meter**	EA
	331213-1M	**1” Meter**	EA
	331213-1.5M	**1 ½” Meter**	EA
	331213-2M	**2” Meter**	EA
35.A		**2” Tap on Main -**	
	331213-2T4	2” or 4” Diameter Main	EA
	331213-2T8	6” or 8” Diameter Main	EA
	331213-2T16	10”, 12”, 14”, or 16” Diameter Main	EA
35.B		**1” Tap on Main -**	
	331213-1T4	2” or 4” Diameter Main	EA
	331213-1T8	6” or 8” Diameter Main	EA
	331213-1T16	10”, 12”, 14”, or 16” Diameter Main	EA
36.A		**Gate Valves -**	
	331216-2GV	2” Diameter	EA
	331216-4GV	4” Diameter	EA
	331216-6GV	6” Diameter	EA
	331216-8GV	8” Diameter	EA
	331216-10GV	10” Diameter	EA
	331216-12GV	12” Diameter	EA
36.B		**Butterfly Valves -**	
	331216-12BV	12” Diameter	EA

	331216-16BV	16” Diameter	EA
	331216-24BV	24” Diameter	EA
	331216-30BV	30” Diameter	EA
	331216-36BV	36” Diameter	EA
	331216-48BV	48” Diameter	EA
	331216-54BV	54” Diameter	EA
36.C		**Line Stop Type Valve -**	
	331216-6LV	6” Diameter	EA
	331216-8LV	8” Diameter	EA
	331216-10LV	10” Diameter	EA
	331216-12V	12” Diameter	EA
	331216-16LV	16” Diameter	EA
36.D		**Insertion Type Valve -**	
	331216-6IV	6” Diameter	EA
	331216-8IV	8” Diameter	EA
	331216-10IV	10” Diameter	EA
	331216-12IV	12” Diameter	EA
	331216-16IV	16” Diameter	EA
36.E		**Tapping Sleeves and Valves -**	
	331216-6X6	6” x 6”	EA
	331216-8X6	8” x 6”	EA
	331216-8X8	8” x 8”	EA
	331216-10X6	10” x 6”	EA
	331216-10X8	10” x 8”	EA
	331216-10X10	10” x 10”	EA
	331216-12X6	12” x 6”	EA
	331216-12X8	12” x 8”	EA
	331216-12X10	12” x 10”	EA
	331216-12X12	12” x 12”	EA
	331216-16X6	16” x 6”	EA
	331216-16X8	16” x 8”	EA
	331216-16X10	16” x 10”	EA
	331216-16X12	16” x 12”	EA
	331216-16X16	16” x 16”	EA
	331216-20X6	20” x 6”	EA
	331216-20X8	20” x 8”	EA
	331216-20X10	20” x 10”	EA

	331216-20X12	20” x 12”	EA
	331216-20X16	20” x 16”	EA
	331216-20X20	20” x 20”	EA
	331216-24X6	24” x 6”	EA
	331216-24X8	24” x 8”	EA
	331216-24X10	24” x 10”	EA
	331216-24X12	24” x 12”	EA
	331216-24X16	24” x 16”	EA
	331216-24X20	24” x 20”	EA
	331216-24X24	24” x 24”	EA
	331216-30X6	30” x 6”	EA
	331216-30X8	30” x 8”	EA
	331216-30X10	30” x 10”	EA
	331216-30X12	30” x 12”	EA
	331216-30X16	30” x 16”	EA
	331216-30X20	30” x 20”	EA
	331216-30X24	30” x 24”	EA
	331216-30X30	30” x 30”	EA
	331216-36X6	36” x 6”	EA
	331216-36X8	36” x 8”	EA
	331216-36X10	36” x 10”	EA
	331216-36X12	36” x 12”	EA
	331216-36X16	36” x 16”	EA
	331216-36X20	36” x 20”	EA
	331216-36X24	36” x 24”	EA
	331216-36X30	36” x 30”	EA
	331216-36X36	36” x 36”	EA
	331216-48X6	48” x 6”	EA
	331216-48X8	48” x 8”	EA
	331216-48X10	48” x 10”	EA
	331216-48X12	48” x 12”	EA
	331216-48X16	48” x 16”	EA
37		**Wet Cut Ins, All Depths -**	
	331216-2WC	2”	EA
	331216-4WC	4”	EA
	331216-6WC	6”	EA
	331216-8WC	8”	EA
	331216-10WC	10”	EA
	331216-12WC	12”	EA

	331216-16WC	16”	EA
	331216-18WC	18”	EA
	331216-20WC	20”	EA
	331216-24WC	24”	EA
	331216-30WC	30”	EA
	331216-36WC	36”	EA
	331216-48WC	48”	EA
	331216-54WC	54”	EA
	331216-72WC	72”	EA
38		**Air Release and Vacuum Valve Assemblies: Water -**	
	331216.10-2ARV	2”	EA
	331216.10-3ARV	3”	EA
	331216.10-4ARV	4”	EA
	331216.10-6ARV	6”	EA
	331216.10-8ARV	8”	EA
39	331219	**Fire Hydrants**	EA
40	331219.81-RFH	**Relocation and/or Reconnection of Existing Fire Hydrants**	EA
41	331219.81-AFH	**Adjust Existing Fire hydrants**	VF
42	331213-SFH	**Salvage Existing Fire Hydrants**	EA
43	331219.81-AVB	**Adjust Valve Box**	EA

Sewer Items

44	24119.81	**Septic Tank Demolition**	EA
45	312300-BED	**Additional Bedding**	CY
46	312300-CR	**Crusher Run Backfill**	TON
47	330130.71	**Manhole Invert Rehabilitation**	EA

48		**Relining Sewers -**	
	330130.72-8	8”	LF
	330130.72-10	10”	LF
	330130.72-12	12”	LF
	330130.72-16	16”	LF
	330130.72-18	18”	LF
	330130.72-20	20”	LF
	330130.72-24	24”	LF
	330130.72-30	30”	LF
	330130.72-36	36”	LF
	330130.72-42	42”	LF
49.A		**Pipe Bursting Including Bursting of Existing Pipe and Pulling Through of HDPE Insertion Pipe -**	
	330130.73-8	8”	LF
	330130.73-10	10”	LF
	330130.73-12	12”	LF
	330130.73-16	16”	LF
	330130.73-18	18”	LF
	330130.73-20	20”	LF
	330130.73-24	24”	LF
	330130.73-30	30”	LF
49.B	330130.73-SC	**Service Connections**	EA
50		**Bypass Pumping -**	
	330130.74-200	0 – 200 Gallons per Minute	HR
	330130.74-400	201 – 400 Gallons per Minute	HR
	330130.74-600	401 – 600 Gallons per Minute	HR
	330130.74-800	601 – 800 Gallons per Minute	HR
	330130.74-1000	801 – 1000 Gallons per Minute	HR
	330130.74-2000	1001 – 2000 Gallons per Minute	HR
	330130.74-3000	2001 – 3000 Gallons per Minute	HR
	330130.74-4000	3001 – 4000 Gallons per Minute	HR
	330130.74-5000	4001 – 5000 Gallons per Minute	HR
	330130.74-6000	5001 – 6000 Gallons per Minute	HR
	330130.74-7000	6001 – 7000 Gallons per Minute	HR
	330130.74-8000	7001 – 8000 Gallons per Minute	HR
	330130.74-9000	8001 – 9000 Gallons per Minute	HR

	330130.74-10000	9001 – 10000 Gallons per Minute	HR
51		**Furnish and Install Precast Concrete Vaults with Bilco Aluminum Hatches -**	
	330516.13-5V	5’x9’x6’ Vault	EA
	330516.13-12V	12’x6’x6’ Vault	EA
52	330516.13-ATOP	**Adjust/Modify Vault Top**	EA
53		Manholes and Structures	
53.A	330516.13-48BBC	**48” Dia. Manhole (Base, Barrels, and Cone)**	VF
53.B	330516.13-60BASE	**60” Dia. Base w/ Transition Slab**	EA
	330516.13-72BASE	**72” Dia. Base w/ Transition Slab**	EA
	330516.13-84BASE	**84” Dia. Base w/ Transition Slab**	EA
	330516.13-96BASE	**96” Dia. Base w/ Transition Slab**	EA
53.C	330516.13-ADDB	**Additional Barrels**	VF
	330516.13-ADDST	**Additional Slab Tops**	EA
53.D		**Manhole Frame and Cover -**	
	330516.13-FCA	Type A	EA
	330516.13-FCB	Type B	EA
	330516.13-FC	Type C	EA
53.E		**Manhole Drops -**	
	330516.13-12DROP	8”, 10”, or 12” Pipe	EA
	330516.13-20DROP	16”, 18”, or 20” Pipe	EA
	330516.13-36DROP	24”, 30”, or 36” Pipe	EA
53.F		**Manhole Coring -**	
	330516.13-24CORE	24” or Less	EA
	330516.13-36CORE	30” or 36”	EA
	330516.13-48CORE	42” or 48”	EA
54	330516.13-ADJB	**Adjust Manhole Barrel**	VF
55	330516.13-ADJC	**Adjust Manhole Cone**	EA
56		**Adjust Manhole Frame and Covers to Grade -**	

	330516.13-ATNP	1 Vertical ft. or less, Non-pavement	EA
	330516.13-ATP	1 Vertical ft. or less, pavement	EA
57	330516.13-ADJARV	**Air Release Manhole Vent Adjustment**	EA
58		**Steel Casing, Bore & Jack Installation -**	
	330523.16-8J	8” Diameter	LF
	330523.16-12J	12” Diameter	LF
	330523.16-16J	16” Diameter	LF
	330523.16-20J	20” Diameter	LF
	330523.16-24J	24” Diameter	LF
	330523.16-30J	30” Diameter	LF
	330523.16-36J	36” Diameter	LF
	330523.16-42J	42” Diameter	LF
	330523.16-48J	48” Diameter	LF
59		**Steel Casing, Open Cut Installation -**	
	330523.16-8O	8” Diameter	LF
	330523.16-12O	12” Diameter	LF
	330523.16-16O	16” Diameter	LF
	330523.16-20O	20” Diameter	LF
	330523.16-24O	24” Diameter	LF
	330523.16-30O	30” Diameter	LF
	330523.16-36O	36” Diameter	LF
	330523.16-42O	42” Diameter	LF
	330523.16-48O	48” Diameter	LF
60		**Uncased Boring, For Main Pipe Size -**	
	330523.16-4U	4” Diameter	LF
	330523.16-8U	8” Diameter	LF
	330523.16-10U	10” Diameter	LF
	330523.16-12U	12” Diameter	LF
	330523.16-16U	16” Diameter	LF
61		**Steel Tunnel Liner -**	
	330523.71-48	48” Diameter	LF
	330523.71-60	60” Diameter	LF
	330523.71-72	72” Diameter	LF
62		**Non-Potable Reuse Lines (Ductile Iron Pipe) -**	

	331100.10-4RU	4” Diameter	LF
	331100.10-6RU	6” Diameter	LF
	331100.10-8RU	8” Diameter	LF
	331100.10-10RU	10” Diameter	LF
	331100.10-12RU	12” Diameter	LF
	331100.10-14RU	14” Diameter	LF
	331100.10-16RU	16” Diameter	LF
	331100.10-20RU	20” Diameter	LF
	331100.10-24RU	24” Diameter	LF
	331100.10-30RU	30” Diameter	LF
	331100.10-36RU	36” Diameter	LF
	331100.10-42RU	42” Diameter	LF
	331100.10-48RU	48” Diameter	LF
63		**Steel Pipe**	
	331113.07-12S	12” Diameter	LF
	331113.07-24S	24” Diameter	LF
	331113.07-36S	36” Diameter	LF
	331113.07-48S	48” Diameter	LF
64		**Air Release and Vacuum Valve Assemblies -**	
	331216.12-2ARVS	2”	EA
	331216.12-3ARVS	3”	EA
	331216.12-4ARVS	4”	EA
	331216.12-6ARVS	6”	EA
	331216.12-8ARVS	8”	EA
		Sanitary Utility Sewerage Piping	
65.A1		**8”PVC Pipe, Depth of Cut -**	
	333100-8PVC1	0.00’ to 7.99’	LF
	333100-8PVC2	8.00’ to 9.99’	LF
	333100-8PVC3	10.00’ to 11.99’	LF
	333100-8PVC4	12.00’ to 13.99’	LF
	333100-8PVC5	14.00’ to 15.99’	LF
	333100-8PVC6	16.00’ to 17.99’	LF
	333100-8PVC7	18.00’ to 19.99’	LF
	333100-8PVC8	20.00’ to 21.99’	LF
	333100-8PVC9	22.00’ to 24.00’	LF
	333100-8PVCEX	8” PVC, as an Extra	LF

65.A2		**8”DIP Pipe, Depth of Cut -**	
	333100-8DIP1	0.00’ to 7.99’	LF
	333100-8DIP2	8.00’ to 9.99’	LF
	333100-8DIP3	10.00’ to 11.99’	LF
	333100-8DIP4	12.00’ to 13.99’	LF
	333100-8DIP5	14.00’ to 15.99’	LF
	333100-8DIP6	16.00’ to 17.99’	LF
	333100-8DIP7	18.00’ to 19.99’	LF
	333100-8DIP8	20.00’ to 21.99’	LF
	333100-8DIP9	22.00’ to 24.00’	LF
	333100-8DIPEX	8” DIP, as an Extra	LF
65.A3		**10”PVC Pipe, Depth of Cut -**	
	333100-10PVC1	0.00’ to 7.99’	LF
	333100-10PVC2	8.00’ to 9.99’	LF
	333100-10PVC3	10.00’ to 11.99’	LF
	333100-10PVC4	12.00’ to 13.99’	LF
	333100-10PVC5	14.00’ to 15.99’	LF
	333100-10PVC6	16.00’ to 17.99’	LF
	333100-10PVC7	18.00’ to 19.99’	LF
	333100-10PVC8	20.00’ to 21.99’	LF
	333100-10PVC9	22.00’ to 24.00’	LF
	333100-10PVCEX	10” PVC, as an Extra	LF
65.A4		**10" DIP Pipe, Depth of Cut -**	
	333100-10DIP1	0.00’ to 7.99’	LF
	333100-10DIP2	8.00’ to 9.99’	LF
	333100-10DIP3	10.00’ to 11.99’	LF
	333100-10DIP4	12.00’ to 13.99’	LF
	333100-10DIP5	14.00’ to 15.99’	LF
	333100-10DIP6	16.00’ to 17.99’	LF
	333100-10DIP7	18.00’ to 19.99’	LF
	333100-10DIP8	20.00’ to 21.99’	LF
	333100-10DIP9	22.00’ to 24.00’	LF
	333100-10DIPEX	10” DIP, as an Extra	LF
65.A5		**12” DIP Pipe, Depth of Cut -**	
	333100-12DIP1	0.00’ to 7.99’	LF
	333100-12DIP2	8.00’ to 9.99’	LF

	333100-12DIP3	10.00’ to 11.99’	LF
	333100-12DIP4	12.00’ to 13.99’	LF
	333100-12DIP5	14.00’ to 15.99’	LF
	333100-12DIP6	16.00’ to 17.99’	LF
	333100-12DIP7	18.00’ to 19.99’	LF
	333100-12DIP8	20.00’ to 21.99’	LF
	333100-12DIP9	22.00’ to 24.00’	LF
	333100-12DIPEX	12” DIP, as an Extra	LF
65.A6		**16” DIP Pipe, Depth of Cut -**	
	333100-16DIP1	0.00’ to 7.99’	LF
	333100-16DIP2	8.00’ to 9.99’	LF
	333100-16DIP3	10.00’ to 11.99’	LF
	333100-16DIP4	12.00’ to 13.99’	LF
	333100-16DIP5	14.00’ to 15.99’	LF
	333100-16DIP6	16.00’ to 17.99’	LF
	333100-16DIP7	18.00’ to 19.99’	LF
	333100-16DIP8	20.00’ to 21.99’	LF
	333100-16DIP9	22.00’ to 24.00’	LF
	333100-16DIPEX	16” DIP, as an Extra	LF
65.A7		**18” DIP, Pressure Class 200, Depth of Cut -**	
	333100-18DIP1	0.00’ to 7.99’	LF
	333100-18DIP2	8.00’ to 9.99’	LF
	333100-18DIP3	10.00’ to 11.99’	LF
	333100-18DIP4	12.00’ to 13.99’	LF
	333100-18DIP5	14.00’ to 15.99’	LF
	333100-18DIP6	16.00’ to 17.99’	LF
	333100-18DIP7	18.00’ to 19.99’	LF
	333100-18DIP8	20.00’ to 21.99’	LF
	333100-18DIP9	22.00’ to 24.00’	LF
	333100-18DIPEX	18” DIP, Pressure Class 350, as an Extra	LF
65.A8		**24” DIP, Pressure Class 200, Depth of Cut -**	
	333100-24DIP1	0.00’ to 7.99’	LF
	333100-24DIP2	8.00’ to 9.99’	LF
	333100-24DIP3	10.00’ to 11.99’	LF
	333100-24DIP4	12.00’ to 13.99’	LF
	333100-24DIP5	14.00’ to 15.99’	LF
	333100-24DIP6	16.00’ to 17.99’	LF

	333100-24DIP7	18.00’ to 19.99’	LF
	333100-24DIP8	20.00’ to 21.99’	LF
	333100-24DIP9	22.00’ to 24.00’	LF
	333100-24DIPEX	24” DIP, Pressure Class 350, as an Extra	LF
65.A9		**30” DIP, Pressure Class 200, Depth of Cut -**	
	333100-30DIP1	0.00’ to 7.99’	LF
	333100-30DIP2	8.00’ to 9.99’	LF
	333100-30DIP3	10.00’ to 11.99’	LF
	333100-30DIP4	12.00’ to 13.99’	LF
	333100-30DIP5	14.00’ to 15.99’	LF
	333100-30DIP6	16.00’ to 17.99’	LF
	333100-30DIP7	18.00’ to 19.99’	LF
	333100-30DIP8	20.00’ to 21.99’	LF
	333100-30DIP9	22.00’ to 24.00’	LF
	333100-30DIPEX	30” DIP, Pressure Class 350, as an Extra	LF
65.A10		**36” DIP, Pressure Class 200, Depth of Cut -**	
	333100-36DIP1	0.00’ to 7.99’	LF
	333100-36DIP2	8.00’ to 9.99’	LF
	333100-36DIP3	10.00’ to 11.99’	LF
	333100-36DIP4	12.00’ to 13.99’	LF
	333100-36DIP5	14.00’ to 15.99’	LF
	333100-36DIP6	16.00’ to 17.99’	LF
	333100-36DIP7	18.00’ to 19.99’	LF
	333100-36DIP8	20.00’ to 21.99’	LF
	333100-36DIP9	22.00’ to 24.00’	LF
	333100-36DIPEX	36” DIP, Pressure Class 350, as an Extra	LF
65.A11		**42” DIP, Pressure Class 200, Depth of Cut -**	
	333100-42DIP1	0.00’ to 7.99’	LF
	333100-42DIP2	8.00’ to 9.99’	LF
	333100-42DIP3	10.00’ to 11.99’	LF
	333100-42DIP4	12.00’ to 13.99’	LF
	333100-42DIP5	14.00’ to 15.99’	LF
	333100-42DIP6	16.00’ to 17.99’	LF
	333100-42DIP7	18.00’ to 19.99’	LF
	333100-42DIP8	20.00’ to 21.99’	LF
	333100-42DIP9	22.00’ to 24.00’	LF
	333100-42DIPEX	42” DIP, Pressure Class 350, as an Extra	LF

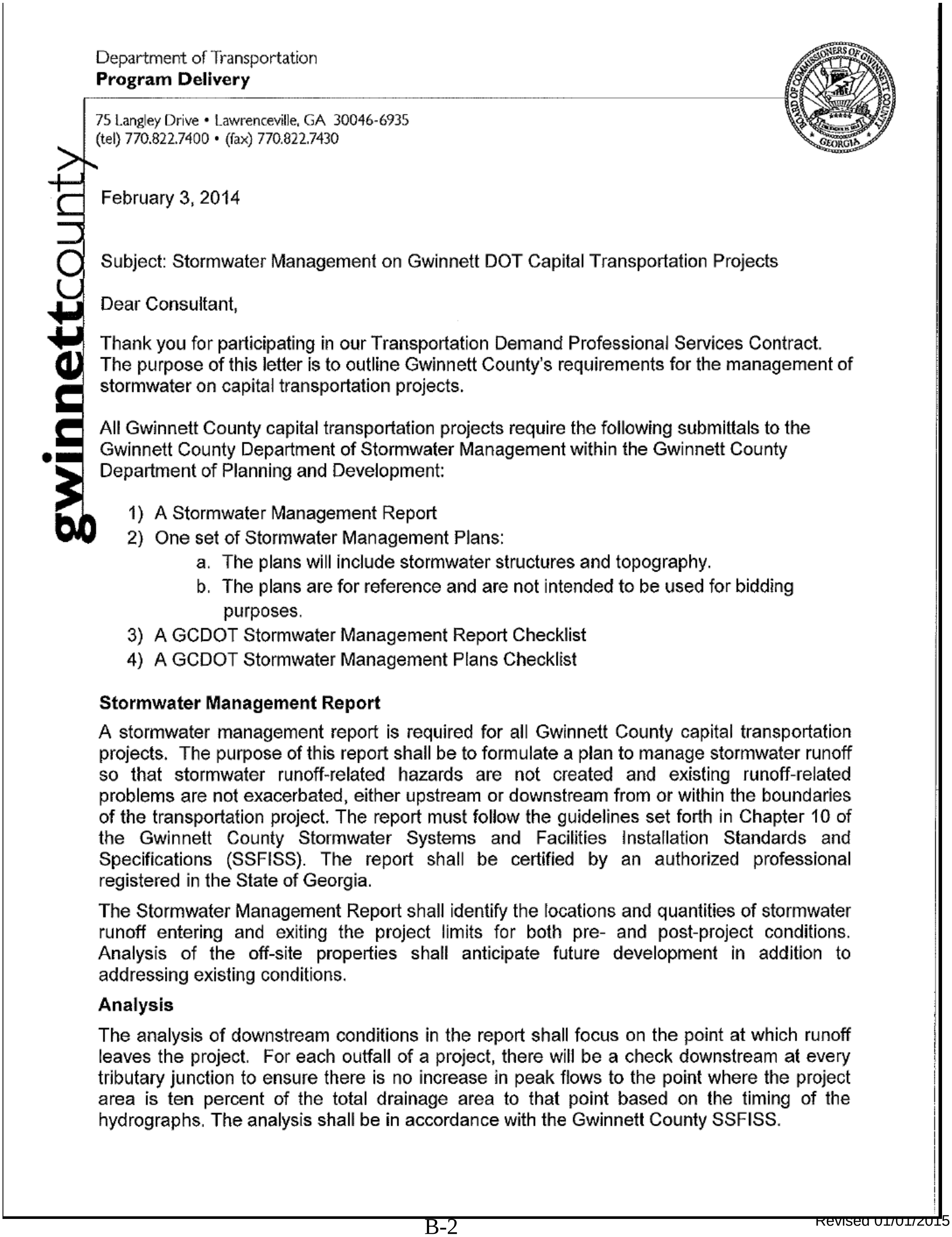
65.A12		**48” DIP, Pressure Class 200, Depth of Cut -**	
	333100-48DIP1	0.00’ to 7.99’	LF
	333100-48DIP2	8.00’ to 9.99’	LF
	333100-48DIP3	10.00’ to 11.99’	LF
	333100-48DIP4	12.00’ to 13.99’	LF
	333100-48DIP5	14.00’ to 15.99’	LF
	333100-48DIP6	16.00’ to 17.99’	LF
	333100-48DIP7	18.00’ to 19.99’	LF
	333100-48DIP8	20.00’ to 21.99’	LF
	333100-48DIP9	22.00’ to 24.00’	LF
	333100-48DIPEX	48” DIP, Pressure Class 350, as an Extra	LF
65.B1	333100-6PVCHSC	**House service Connections, 6” PVC**	LF
65.B2	333100-6DIPHSC	**House service Connections, 6” DIP**	LF
66.A		**Sanitary Utility Sewerage Force Mains, Pressure Class 200 DIP -**	
	333400-4FM	4”	LF
	333400-4FMRJ	4” Restrained Joint Pipe	LF
	333400-6FM	6”	LF
	333400-6FMRJ	6” Restrained Joint Pipe	LF
	333400-8FM	8”	LF
	333400-8FMRJ	8” Restrained Joint Pipe	LF
	333400-10FM	10”	LF
	333400-10FMRJ	10” Restrained Joint Pipe	LF
	333400-12FM	12”	LF
	333400-12FMRJ	12” Restrained Joint Pipe	LF
	333400-16FM	16”	LF
	333400-16FMRJ	16” Restrained Joint Pipe	LF
	333400-20FM	20”	LF
	333400-20FMRJ	20” Restrained Joint Pipe	LF
	333400-24FM	24”	LF
	333400-24FMRJ	24” Restrained Joint Pipe	LF
	333400-30FM	30”	LF
	333400-30FMRJ	30” Restrained Joint Pipe	LF
	333400-36FM	36”	LF
	333400-36FMRJ	36” Restrained Joint Pipe	LF
	333400-42FM	42”	LF
	333400-42FMRJ	42” Restrained Joint Pipe	LF

	333400-48FM	48”	LF
	333400-48FMRJ	48” Restrained Joint Pipe	LF
	333400-ED	Extra Depth over 8’	LF
66.B		**Wet Cut Ins, All Depths -**	
	333400-4WC	4”	EA
	333400-6WC	6”	EA
	333400-8WC	8”	EA
	333400-10WC	10”	EA
	333400-12WC	12”	EA
	333400-16WC	16”	EA
	333400-20WC	20”	EA
	333400-24WC	24”	EA
	333400-30WC	30”	EA
	333400-36WC	36”	EA
	333400-42WC	42”	EA
	333400-48WC	48”	EA
66.C		**Plug Valves -**	
	333400-4PLUG	4”	EA
	333400-6PLUG	6”	EA
	333400-8PLUG	8”	EA
	333400-10PLUG	10”	EA
	333400-12PLUG	12”	EA
	333400-16PLUG	16”	EA
	333400-20PLUG	20”	EA
	333400-24PLUG	24”	EA
	333400-30PLUG	30”	EA
	333400-36PLUG	36”	EA
	333400-42PLUG	42”	EA
	333400-48PLUG	48”	EA
67.A	333400-UG250	**Upgrade DIP to Pressure Class 250 Pipe**	LF
67.B	333400-UG350	**Upgrade DIP to Pressure Class 350 Pipe (for 4” to 16” DIP)**	LF
68		**Lower Existing Ductile Iron Pipe in Place Labor and Equipment Only -**	
	333400-6L	6” Diameter	LF

333400-8L	8” Diameter	LF
333400-10L	10” Diameter	LF
333400-12L	12” Diameter	LF
333400-14L	14” Diameter	LF
333400-16L	16” Diameter	LF

APPENDIX B

STORMWATER MANAGEMENT MEMORANDUM



gwinnettcounty

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February 3, 2014

Subject: Stormwater Management on Gwinnett DOT Capital Transportation Projects

Dear Consultant,

Thank you for participating in our Transportation Demand Professional Services Contract. The purpose of this letter is to outline Gwinnett County's requirements for the management of stormwater on capital transportation projects.

All Gwinnett County capital transportation projects require the following submittals to the Gwinnett County Department of Stormwater Management within the Gwinnett County Department of Planning and Development:

1) A Stormwater Management Report
2) One set of Stormwater Management Plans:
    a. The plans will include stormwater structures and topography.
    b. The plans are for reference and are not intended to be used for bidding purposes.
3) A GCDOT Stormwater Management Report Checklist
4) A GCDOT Stormwater Management Plans Checklist

Stormwater Management Report

A stormwater management report is required for all Gwinnett County capital transportation projects. The purpose of this report shall be to formulate a plan to manage stormwater runoff so that stormwater runoff-related hazards are not created and existing runoff-related problems are not exacerbated, either upstream or downstream from or within the boundaries of the transportation project. The report must follow the guidelines set forth in Chapter 10 of the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications (SSFISS). The report shall be certified by an authorized professional registered in the State of Georgia.

The Stormwater Management Report shall identify the locations and quantities of stormwater runoff entering and exiting the project limits for both pre- and post-project conditions. Analysis of the off-site properties shall anticipate future development in addition to addressing existing conditions.

Analysis

The analysis of downstream conditions in the report shall focus on the point at which runoff leaves the project. For each outfall of a project, there will be a check downstream at every tributary junction to ensure there is no increase in peak flows to the point where the project area is ten percent of the total drainage area to that point based on the timing of the hydrographs. The analysis shall be in accordance with the Gwinnett County SSFISS.

The following criteria shall be evaluated by the authorized registered professional preparing the Stormwater Management Report to determine if detention or some other form of mitigation is required for any portion of the project:

- Existing land uses downstream;
- Anticipated future land uses downstream;
- Magnitude of increase in peak flows due to the project;
- Presence of existing drainage problems;
- Capacity of existing and anticipated drainage systems;
- Creation of concentrated flows where none had occurred previously;
- Availability of feasible locations for detention facilities;
- Existing flows generated off-site which pass through the project site; and,
- The nature of the receiving watercourse

Stormwater Mitigation Required

It is the intention of the County that capital transportation projects have the impacts of peak flow increase, volume increase and velocity mitigated through the use of proper design procedures. Detention is not to be required automatically, but rather the mitigation of downstream impacts shall be the objective.

Whenever a Stormwater Management Report indicates that an adverse impact from stormwater runoff is expected to result from an outfall of a transportation improvement project, that outfall shall be provided with stormwater treatment. Adverse impact shall be understood to mean when pre-project flows did not cause difficulties and post-project flows do. Difficulties shall include but not be limited to situations where 25-year velocities exceed the non-erosive velocity of the stream, habitable structures are shown to be subject to increased depth of flooding for any frequency up to and including the regulatory flood, and stormwater facilities cannot carry the design storm in accordance with these regulations.

Stormwater treatment facilities shall be provided, unless the authorized registered professional certifies and provides certified documentation to the Department supporting the conclusion that at least one of the following is true and correct as applicable:

- The non-detained, post-project runoff will leave the project site through a well-defined swale or pipe collection system, and the runoff will not exceed the capacity of the anticipated drainage system. The runoff must be shown to create no adverse impact to downstream facilities or properties. The post-project increase for a 25-year storm should not exceed five (5) percent of the pre-project flow.
- The non-detained, post-project runoff will leave the project site as sheet flow, and will not have an adverse impact upon downstream properties. The increase for a 25-year storm should not exceed 1 cfs over a length perpendicular to the flow of 100 feet.
- The effect of detention would be to concentrate flows where sheet flow had occurred under pre-developed conditions, and any impact of increase sheet flows upon downstream properties would be less adverse than that which would result from the

concentrated flows from a detention facility even if energy dissipation devices were employed.

- The undetained flow will pass through downstream properties, in drainage easements obtained by the County, to the point in the downstream analysis that shows that detention is not required.
- Where the site runoff will flow directly into a stream or lake without crossing off-site properties and does not exceed an erosive velocity set forth in the SSFISS.

If the Stormwater Management Report indicates an adverse impact, the Department may choose to acquire a drainage easement and/or improve the conveyance channel to the point where the adverse impact is alleviated.

The post-project peak flows in a receiving channel may not exceed pre-project flows by more than 5% unless a variance is granted by the Department. Peak detention for the 2-year through the 25-year storm is not required if the downstream analysis using timing of the hydrographs shows no adverse impact from the outfall of the project to the point immediately downstream from the project where the project area is 10 percent of the total drainage basin area.

Should the authorized registered professional conclude that stormwater detention may not be necessary, rigid compliance with all of the following criteria is necessary and mandatory:

- A stormwater management report will always be required whether or not stormwater detention is required.
- If the applicant proposes to show that the detention or other mitigation requirements may be eliminated for all or a portion of a project, then a pre-submittal conference with the Department's staff is required prior to preparation and submittal of construction plans for the project.
- At the pre-submittal conference with the staff, the consultant shall be prepared to discuss the downstream analysis findings as follows:
    - The affected stream must be analyzed downstream from the project to a point where the project area is 10 percent of the total drainage basin. The analysis must include all culverts, obstructions, existing and potential erosion problems, elevations of existing improvements, and any other existing modifications to natural conditions; and,
    - If the existing downstream conditions are overburdened by the pre-developed flows in the stream, then detention or other mitigation shall be required unless the Department elects to eliminate the downstream overburdened conditions as part of the project; and,
    - If there are any existing drainage complaints downstream, then detention or other mitigation shall be required unless the project minimizes the conditions causing the complaint.

Detention Design Criteria

All stormwater detention pond hydrologic and hydraulic analysis and design calculations shall be certified by an authorized registered professional. The design shall be in accordance with the Gwinnett County SSFISS.

All stormwater detention facilities shall be designed to detain the 1-year storm runoff, for the area draining to the detention facility, for 24 hours. This volume is called the channel protection volume and shall be equal to or greater than the 1-year storm runoff volume from the project. In addition, these facilities shall control the peak flow rates associated with storms having 2-year, 5-year, 10-year, and 25-year return frequencies so that flows from the post-project site do not exceed pre-project conditions at the point of analysis nor increase the peak flows downstream from the project to the point in the drainage basin where the project area is 10 percent of the total basin. Where adverse impacts, as defined above, occur during the 100-year storm, the 100-year storm shall also be regulated. Water Quality treatment will be provided for new location roadways passing through previously undeveloped areas.

The hydrologic methodology used for any given project shall conform to the Gwinnett County SSFISS.

Runoff coefficients and runoff Curve Numbers shall be consistent with those shown in the Gwinnett County SSFISS. Pre-project curve numbers shall represent actual conditions, and post-project curve numbers shall represent the proposed condition.

Calculations shall be provided showing how all times of concentration or lag times were computed, both for pre- and post-project conditions. Likewise, adequate support must be provided for all composite runoff coefficients or curve numbers used.

Detention Facility Construction Standards

Stormwater detention facilities shall be constructed in accordance with plans reviewed and approved by the Department, and shall be in place and inspected prior to the initiation of other improvements. If the detention facility is planned to be a lake, temporary detention facilities shall be provided and shall remain in place until such time as the lake has become effective in providing stormwater management.

Sincerely,

John Ray
Director of Preconstruction, Program Delivery
Gwinnett County Department of Transportation

c: Kim Conroy, P.E. Director
Alan Chapman, P.E.
David Tucker, ASLA
Lewis Cooksey, P.E.
Casey Graham, P.E.
Scott Vickery
Adena Fullard

GCDOT PLAN SUBMITTAL CHECKLIST

Date: 10/08/2019

The following checklist shall be completed and submitted by the Designer when submitting plans to GCDOT.

PRELIMINARY CONSTRUCTION PLANS:

____ Three paper copies of the transmittal

____ Three paper copies of the GCDOT Plan Submittal Checklist

____ Three paper copies of the GCDOT Plan Preparation Guidelines Quality Assurance Checklist for Preliminary Plans

____ Three half-size (11" x 17") and two full-size (24" x 36") sets of the Preliminary Construction Plans

____ PDF and CAD files of the preliminary plans uploaded to the GCDOT FTP site. PDF plans are to be assembled into one file. One file will be (11"x17") and the other file will be (24"x36"). PDF files are to have the following naming convention: Project Number Title of Document Date (ex: F-1255-01 Preliminary Plans 2019-7-26)

____ One paper copy and one PDF copy of the Drainage Report

____ One PDF copy of the preliminary MS4 Storm Water Management Report that the consultant will submit to the Gwinnett County Department and Planning and Development for approval (if available)

____ One paper copy and one PDF copy of the Soil Survey Report (if required)

____ One paper copy and one PDF copy of the Bridge Foundation Investigation Report (if required)

____ One paper copy and one PDF copy of the Wall Foundation Investigation Report (If required)

____ One paper copy and one PDF copy of the Bridge Hydraulics Report (if required)

____ One paper copy and one PDF copy of the AutoTurn turning template printout (if required)

____ One paper copy and one PDF copy of the Construction Cost Estimate

RIGHT-OF-WAY PLANS:

____ Three paper copies of the transmittal

____ Three paper copies of the GCDOT Plan Submittal Checklist

____ Three paper copies of the GCDOT Plan Preparation Guidelines Quality Assurance Checklist for Right-of-Way Plans

____ PDF files of Right of Way plans uploaded to the GCDOT FTP site. PDF plans are to be assembled into one file. One file will be (11”x17”) and the other file will be (24”x36”). PDF files are to have the following naming convention: Project Number Title of Document Date (ex: F-1255-01 ROW Plans 2019-7-26)

____ Three half-size (11” x 17”) and two full-size (24” x 36”) sets of the Right of Way plans

____ One PDF copy of the deeds and plats used to create right-of-way and property lines

____ Three paper copies of responses to RW Plan Review Comments

RIGHT-OF-WAY PLAN REVISIONS:

Official right-of-way plan revisions are defined as any right-of-way revision that occurs after the right-of-way plans have been approved for acquisition. Any changes that occur after that date should have the revision date on the right-of-way cover sheet, plan sheet, and the date and description on the revision summary sheet.

____ Three paper copies of the transmittal

____ Three half-size (11”x17”) and two full-size (24”x36”) sets of the revised right-of-way plan sheets

____ One (11”x17”) PDF and one (24”x36”) PDF of the revised right-of-way plan sheets

90% CONSTRUCTION PLANS:

____ Three paper copies of the transmittal

____ Three paper copies of the GCDOT Plan Submittal Checklist

____ Three paper copies of the GCDOT Plan Preparation Guidelines Quality Assurance Checklist for Final Plans

____ Three paper copies of responses to Field Plan Review Comments

____ Three half-size (11” x 17”) and two full-size (24” x 36”) sets of the 90% Construction Plans

____ PDF and CAD files of the 90% construction plans uploaded to the GCDOT FTP Site. PDF plans are to be assembled into one file. One file will be (11”x17”) and the other file will be (24”x36”). PDF files are to have the following naming convention: Project Number Title of Document Date (ex: F-1255-01 90 Plans 2019-7-26)

____ One paper copy and one PDF copy of the Earthwork Quantities

____ One paper copy and one PDF copy of the Leveling Calculations

____ One PDF copy of the Bridge design calculations (If required)

____ One paper copy and one PDF copy of any project specific special provisions (If required)

____ One paper copy and one PDF copy of the Drainage Report (If corrections required from the preliminary submittal)

____ One PDF copy of the MS4 Storm Water Management Report that the consultant submitted to the Gwinnett County Department of Planning and Development for approval

____ One paper copies and one PDF copy of the Construction Cost Estimate

FINAL PLANS:

____ Three paper copies of the transmittal

____ Three paper copies of the GCDOT Plan Submittal Checklist

____ Three paper copies of the GCDOT Plan Preparation Guidelines Quality Assurance Checklist for Final Plans

____ Three paper copies of responses to the 90% Construction Plan Review Comments

____ Three half-size (11” x 17”) and two full-size (24” x 36”) Construction Plans

____ PDF and CAD Plan files uploaded to the GCDOT FTP Site. PDF plans are to be assembled into one file. One file will be (11”x17”) and the other file will be (24”x36”). PDF files are to have the following naming convention: Project Number Title of Document Date (ex: F-1255-01 Final Plans 2019-7-26)

____ One paper copy and one PDF copy of the Earthwork Quantities

____ One paper copy and one PDF copy of the Final Project Specific Special Provisions

____ One paper copy and one PDF copy of the Final Leveling Calculations

____ One paper copy and one Excel copy of the Construction Cost Estimate

____ One PDF copy of approval from the Gwinnett County Department of Planning and Development for the MS4 Storm Water Management Report

____ One PDF copy of the approved MS4 Storm Water Management Report

____ One paper copy and one PDF copy of the final Drainage Report

GCDOT PLAN SUBMITTAL CHECKLIST

Date: 10/08/2019

CONSTRUCTION REVISIONS:

Construction revisions are defined as any plan revision that occurs in the time period beginning at the time the project is advertised and ends at the time the bids are opened. The date the bids are opened is referred to as the LET date. Any changes to the plans that occur during this time period should have the revision date on the cover sheet, revised plan sheet, and the revision summary sheet. Note: the label "Use-On-Construction" should not be placed on the plans during this phase.

____ Three half-size (11"x17") and two full-size (24"x36") Construction Plans
____ Updated CAD and PDF plans

"USE-ON-CONSTRUCTION" REVISIONS"

"Use-on-Construction" revisions are defined as any revision that occurs after the LET date which is the date after the bids have been opened. Any changes to the plans that occur during this time period shall have the revision date on the cover sheet, revision summary sheet and the revised plans sheets. Quantity changes and revision descriptions should be on the revision summary sheet. The words "USE-OF-CONSTRUCTION" shall be placed on the revised plan sheets. NOTE: THE SUMMARY OF QUANTITY AND THE DETAIL ESTIMATE SHEETS SHOULD NOT BE CHANGED AFTER THE LET DATE.

____ One full-size (24"x36") Construction Plans
____ Updated CAD and PDF plans

I certify that all of the requested items have been included in this plan submittal.

______________________________	______________________________	______________
Designer	Company	Date

EXHIBIT E

CONFLICT OF INTEREST CERTIFICATION

I, ________________________, as the legal representative of ________________________, do certify that this proposal is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the Proposal is genuine and not collusive or sham; that ___________________________ has not directly or indirectly colluded, conspired, connived, or agreed with anyone else to put in a sham proposal, or that anyone shall refrain from proposing; that _______________________ has not in any manner, directly or indirectly sought by agreement, communication or conference with anyone to fix the proposal price, or to secure any advantage against or with the public or private body awarding the contract of anyone interested in the proposed contract; that all statements contained in the proposal are true; and further, that ____________________________ has not, directly or indirectly, submitted his/her price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay any fee to any corporation, partnership, company, association, organization, or to any member or agent thereof, to effectuate a collusive or sham proposal. If applicable, ___________________________ shall disclose all public and private sector clients, including authorities, which may exist within incorporated City of Snellville, Georgia at the time the Contract is executed. In addition, ___________________ will be required for the duration of the Contract to continue this disclosure throughout the project duration, and if any conflict or potential conflict of interest occurs during the project duration, ________________________ shall disclose conflict or potential conflict as soon as it is known. No gift, gratuity or monetary contribution has been provided to any City of Snellville government employee, any member of the City of Snellville City Council or city project engineering consultant under contract with the city to provide Project Engineering Services on this project from _________________________________as a corporate entity or employee of

______________________________.

Name: ____

Title: ____

Date: ____

EXHIBIT F

ACCEPTANCE FORM

Technical proposals are to be mailed to the attention of City Manager Butch Sanders; 2342 Oak Road, Snellville, GA 30078, by no later than 3:00 PM, December 3rd, 2021. The face of a sealed envelope the following shall be noted as follows: **"RFP for Professional Engineering Services - Wisteria Road at North Road Intersection Improvements".**

Technical proposals received after that date and time. Three originals of the technical proposal and a thumb drive of the proposal shall be included in the envelope. Fee proposals are not to be submitted at this time.

The process for selection of engineering firms will be primarily Qualification-Based (QBS) – Brooks Act. Fees will be a minor component of the overall score. Only technical proposals are to be submitted at this time. A Recommendation Committee will identify the short-listed firms. These firms may be required to attend an interview and present a schematic plan of their respective approach.

In compliance with this Request for Proposal dated November 8th, 2021, which includes all requirements, provisions and exhibits attached and referenced therein, and subject to all the terms and conditions set forth herein, the undersigned offers and agrees to furnish the services described in the RFP

Cited above and submit this signed technical proposal which includes this completed and signed page and other data as required by the RFP. It is understood that this proposal and the scope of services may be modified, by mutual agreement in subsequent negotiations if short-listed and identified to be the highest ranked firm.

NAME AND ADDRESS OF FIRM: DATE: ______________________

______________________________________ By: ______________________
(signature)

______________________________________ ______________________
(print)

______________________________________ Title: ______________________

______________________________________ Phone: ______________________

EIS # : ________________________________

EXHIBIT G

E-VERIFY AFFIDAVITS

City of Snellville, Georgia

CONTRACTOR AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with the City of Snellville has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of1986 (IRCA) P.L. 99-603), in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to this contract the City of Snellville, contractor will secure from such contractor(s) similar verification of compliance with O.C.G.A. 13-10-91 on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the City of Snellville at the time the subcontractor(s) is retained to provide the service.

____
EEV/ Basic Pilot Program* User Identification Number

____ ____________
BY: Authorized Officer or Agent COMPANY Date

____
Title of Authorized Office or Agent

SUBSCRIBED AND SWORN

BEFORE ME ON THIS THE

______DAY OF________20____

Notary Public
My Commission Expires:

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*As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV/Basic Rule Pilot Program" operated by the U.S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in Conjunction with the Social Security Administration

City of Snellville, Georgia

SUBCONTRACTOR (s) AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with the City of Snellville has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of1986 (IRCA) P.L. 99-603), in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91

____

EEV/ Basic Pilot Program* User Identification Number

____ Date ____________

BY: Authorized Officer or Agent COMPANY

(Subcontractor Name)

____

Title of Authorized Office or Agent of Subcontractor

SUBSCRIBED AND SWORN

BEFORE ME ON THIS THE

______DAY OF________20___

Notary Public
My Commission Expires:

____

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*As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the “EEV/Basic Rule Pilot Program” operated by the U.S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in Conjunction with the Social Security Administration (SSA)