



Planning and Zoning
1975 Lakeside Parkway, Suite 350
Tucker, GA 30084
Phone: 678-597-9040
Email: permits@tuckerga.gov
Website: www.tuckerga.gov

Land Use Petition Application

Type of Application: ☐ Rezoning ☐ Comprehensive Plan Amendment ☒ Special Land Use Permit
☒ Concurrent Variance ☒ Modification

APPLICANT INFORMATION

Applicant is the: ☐ Property Owner ☐ Owner's Agent ☒ Contract Purchaser

Name: **Chick-fil-A, Inc.**

Address: **5200 Buffington Road**

City: **Atlanta**

State: **GA**

Zip: **30349**

Contact Name: **Jennifer Santelli**

Phone: **770-324-5282**

Email: **jenn.santelli@cfacorp.com**

OWNER INFORMATION

Name: **John Poulakis**

Address: **1610 DeKalb Avenue**

City: **Atlanta**

State: **GA**

Zip: **30307**

Contact Name: **John Poulakis**

Phone: **404-536-7601**

Email: **cookiepoulakis@hotmail.com**

PROPERTY INFORMATION

Property Address: **4435 Hugh Howell Road Tucker, GA 30084**

Present Zoning District(s): **DT-2**

Requested Zoning District(s):

Present Land Use Category: **Downtown Corridor**

Requested Land Use Category:

Land District: **18**

Land Lot(s): **214**

Acreage: **2.05**

Proposed Development: **Chick-fil-A Restaurant**

Concurrent Variance(s): **N/A**

RESIDENTIAL DEVELOPMENT

No. of Lots/Dwelling Units:

Dwelling Unit Size (Sq. Ft.):

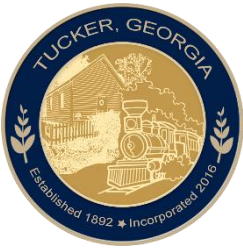
Density:

NON-RESIDENTIAL DEVELOPMENT

No. of Buildings/Lots: **1**

Total Building Sq. Ft.: **4,989**

Density: **.056**



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City: **Atlanta**

State: **GA**

Zip: **30349**

Contact Name: **Jennifer Santelli**

Phone: **770-324-5282**

Email: **jenn.santelli@cfacorp.com**

OWNER INFORMATION

Name: **Scott and Wanda Nelson**

Address: **4874 Five Forks Trickum Rd SW**

City: **Lilburn**

State: **GA**

Zip: **30047**

Contact Name: **Wanda Nelson**

Phone: **(770) 493-7068**

Email: **Seinc1@bellsouth.net**

PROPERTY INFORMATION

Property Address: **2239 Dillard St**

Present Zoning District(s): **C-1**

Requested Zoning District(s):

Present Land Use Category: **Local Commercial**

Requested Land Use Category:

Land District:

Land Lot(s):

Acreage: **0.28**

Proposed Development: **Chick-fil-A restaurant**

Concurrent Variance(s): **CV-21-0002, CV-21-0003, and CV-21-0004, plus added variance for residential buffer**

RESIDENTIAL DEVELOPMENT

No. of Lots/Dwelling Units:

Dwelling Unit Size (Sq. Ft.):

Density:

NON-RESIDENTIAL DEVELOPMENT

No. of Buildings/Lots: **1**

Total Building Sq. Ft.: **2,500 SF**

Density: **.205**



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Land Use Petition Application Checklist

FOR ALL REZONINGS, COMPREHENSIVE PLAN AMENDMENTS, SPECIAL LAND USE PERMITS, MODIFICATIONS, AND CONCURRENT VARIANCES

REQUIRED ITEMS	NUMBER OF COPIES	CHECK <input checked="" type="checkbox"/>
One (1) digital copy of all submitted materials	• One (1) flash drive or CD in .JPEG, .PDF format	<input checked="" type="checkbox"/>
Pre-Application Meeting Form	• One (1) Copy	<input type="checkbox"/>
Public Participation Report	• One (1) Copy	<input checked="" type="checkbox"/>
Application, Signature Pages, Disclosure Form	• One (1) Copy each	<input checked="" type="checkbox"/>
Written Legal Description	• One (1) 8 ½" x 11" Legal Description	<input checked="" type="checkbox"/>
Boundary Survey and Proposed Site Plan (See Page 9 for Requirements)	• Five (5) Full-Size (24" x 36") Copies of each • One (1) 8 ½" x 11" or 11x17 Site Plan of each	<input checked="" type="checkbox"/>
Building Elevations (renderings or architectural drawings to show compliance with Article 5)	• One (1) Copy	<input checked="" type="checkbox"/>
Letter of Intent	• One (1) Copy	<input checked="" type="checkbox"/>
Analysis of Standards/Criteria (See page 5)	• One (1) Copy	<input checked="" type="checkbox"/>
Environmental Site Analysis Form	• One (1) Copy	<input checked="" type="checkbox"/>
Trip Generation Letter (ITE Trip Generation Manual)	• One (1) Copy	<input checked="" type="checkbox"/>
THE FOLLOWING ITEMS MAY BE REQUIRED		
Traffic Impact Study (See Sec. 46-1309)	• Three (3) Copies	<input checked="" type="checkbox"/>
Development of Regional Impact Review Form	• Three (3) Copies	<input type="checkbox"/>
Environmental Impact Report	• Three (3) Copies	<input type="checkbox"/>
Noise Study Report	• Three (3) Copies	<input type="checkbox"/>
Other items required per the Zoning Ordinance	• Three (3) Copies	<input type="checkbox"/>
LAND USE PETITION FEE SCHEDULE		
Residential Rezoning	\$500	<input type="checkbox"/>
Multifamily Rezoning	\$750	<input type="checkbox"/>
Non-Residential Rezoning	\$750	<input type="checkbox"/>
Special Land Use Permit	\$400	<input checked="" type="checkbox"/>
Comprehensive Plan Amendment	\$1000	<input type="checkbox"/>
Modification	\$250	<input checked="" type="checkbox"/>
Variance (includes Concurrent Variance)	\$300	<input checked="" type="checkbox"/>
Public Notice Sign Fee	\$80 (per required sign)	<input checked="" type="checkbox"/>

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03/18/2022

PLANNING & ZONING
DEPARTMENT

SLUP-21-0004, CV-21-0002, CV-21-0003, CV-21-0004, CV-22-0006

APPLICANT'S CERTIFICATION

THE UNDERSIGNED BELOW STATES UNDER OATH THAT THEY ARE AUTHORIZED TO MAKE THIS APPLICATION. THE UNDERSIGNED IS AWARE THAT NO APPLICATION OR REAPPLICATION AFFECTING THE SAME LAND SHALL BE ACTED UPON WITHIN 24 MONTHS FROM THE DATE OF LAST ACTION BY THE MAYOR AND CITY COUNCIL.

Public Participation Plan Report
Project Name:

Jennifer Santelli
Signature of Applicant

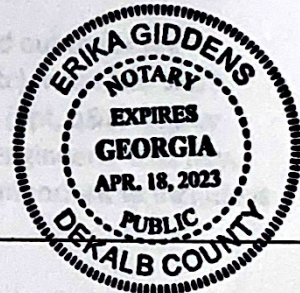
August 5, 2021
(Date)

Jennifer Santelli, Principal Development Lead
Type or Print Name and Title

Erika Giddens
Signature of Notary Public

August 5, 2021
Date

Notary Seal



1. Was question/concern/comment/request for change to the proposed plans?

Applicant Response:

2. Was question/concern/comment/request for change to the proposed plans?

Applicant Response:

3. Was question/concern/comment/request for change to the proposed plans?

Applicant Response:

Applicant Response:

APPLICANT'S CERTIFICATION

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Bridgette Ganker

8/13/21

Signature of Applicant

Date

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03/18/2022
PLANNING & ZONING
DEPARTMENT

Bridgette Ganker, Branch Manager

Type or Print Name and Title

Matthew Roberts

8-13-21

Signature of Notary Public

Date

Notary Seal

MATTHEW ROBERTS
NOTARY PUBLIC
Cherokee County
State of Georgia
My Comm. Expires July 29, 2022

PROPERTY OWNER'S CERTIFICATION

I do solemnly swear and attest, subject to criminal penalties for false swearing, that I am the legal owner, as reflected in the records of DeKalb County, Georgia, of the property identified below, which is the subject of the attached Land Use Petition before the City of Tucker, Georgia. As the legal owner of record of the subject property, I hereby authorize the individual named below to act as the applicant in the pursuit of the Application for Rezoning (RZ), Comprehensive Plan Amendment (CA), Special Land Use Permit (SLUP), Modification (M) & Concurrent Variance (CV) in request of the items indicated below.

I, John Poulakis, authorize, Chick-fil-A, Inc.
(Property Owner) (Applicant)

to file for SLUP, at 4435 Hugh Howell Road
(RZ, CA, SLUP, M, CV) (Address)

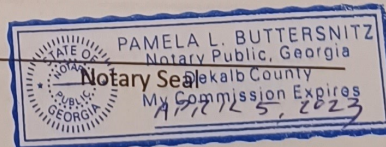
on this date 8, 11, 20 21
(Month) (Day)

- I understand that if a rezoning is denied or assigned a zoning classification other than the classification requested in the application, then no portion of the same property may again be considered for rezoning for a period of twenty-four (24) months from the date of the mayor and city councils' final decision.
- I understand that if an application for a special land use permit affecting all or a portion of the same property for which an application for the same special land use was denied shall not be submitted before twenty-four (24) months have passed from the date of final decision by the mayor and city council on the previous special land use permit.
- I understand that failure to supply all required information (per the relevant Applicant Checklists and requirements of the Tucker Zoning Ordinance) will result in REJECTION OF THE APPLICATION.
- I understand that preliminary approval of my design plan does not authorize final approval of my zoning or signage request. I agree to arrange additional permitting separately, after approval is obtained.
- I understand that representation associated with this application on behalf of the property owner, project coordinator, potential property owner, agent or such other representative shall be binding.

[Signature] 8/11/21
Signature of Property Owner Date

John Poulakis
Type or Print Name and Title

[Signature] 08-11-2021
Signature of Notary Public Date



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SLUP-21-0004, CV-21-0002, CV-21-0003, CV-21-0004, CV-22-0006

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I, Scott Nelson, authorize, Chick-fil-A, Inc.,
(Property Owner) (Applicant)
to file for SLUP at 4435 Hugh Howell Rd and 2239 Dillard St
(RZ, CA, SLUP, M, CV) (Address)
on this date _____, 20_____
(Month) (Day)

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Signature of Property Owner

3/14/22
Date

Scott Nelson

Type or Print Name and Title

Signature of Notary Public

3/14/22
Date



ANALYSIS OF STANDARDS/CRITERIA

ZONING MAP AMENDMENT CRITERIA

Section 46-1560 of the City of Tucker Zoning Ordinance lists standards and factors that are found to be relevant to the exercise of the city's zoning powers and shall govern the review of all proposed amendments to the Official Zoning Map. The applicant shall write a detailed written analysis of each standard and factor as it relates to their proposed project.

COMPREHENSIVE PLAN MAP AMENDMENT CRITERIA

Section Sec. 46-1559 of the City of Tucker Zoning Ordinance lists standards and factors that are found to be relevant for evaluating applications for amendments to the comprehensive plan map and shall govern the review of all proposed amendments to the comprehensive plan map. The applicant shall write a detailed written analysis of each standard and factor as it relates to their proposed project.

SPECIAL LAND USE PERMIT CRITERIA

Section 46-1594 and 46-1595 of the City of Tucker Zoning Ordinance lists specific criteria that shall be considered by the planning and zoning department, the planning commission, and the mayor and city council in evaluating and deciding any application for a special land use permit. No application for a special land use permit shall be granted by the mayor and city council unless satisfactory provisions and arrangements have been made concerning each of the following factors, all of which are applicable to each application, and the application is in compliance with all applicable regulations in Article 4. The applicant shall write a detailed written analysis of criteria as it relates to their proposed project.

CONCURRENT VARIANCE CRITERIA

Section 46-1633 of the City of Tucker Zoning Ordinance lists specific criteria the board shall use in determining whether or not to grant a variance. The applicant shall provide a written analysis of how the request complies with this criteria, if they are requesting a concurrent variance.

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ENVIRONMENTAL SITE ANALYSIS FORM

Analyze the impact of the proposed rezoning and provide a written point-by-point response to Points 1 through 3:

1. **CONFORMANCE WITH THE COMPREHENSIVE PLAN**. Describe the proposed project and the existing environmental conditions on the site. Describe adjacent properties. Include a site plan that depicts the proposed project.

Describe how the project conforms to the Comprehensive Land Use Plan. Include the portion of the Comprehensive Plan Land Use Map which supports the project's conformity to the Plan. Evaluate the proposed project with respect to the land use suggestion of the Comprehensive Plan as well as any pertinent Plan policies.

2. **ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT**. For each environmental site feature listed below, indicate the presence or absence of that feature on the property. Describe how the proposed project may encroach or adversely affect an environmental site feature. Information on environmental site features may be obtained from the indicated source(s).

- a. Wetlands
 - U. S. Fish and Wildlife Service, National Wetlands Inventory (<http://wetlands.fws.gov/downloads.htm>)
 - Georgia Geologic Survey (404-656-3214)
 - Field observation and subsequent wetlands delineation/survey if applicable
- b. Floodplain
 - Federal Emergency Management Agency (<http://www.fema.org>)
 - Field observation and verification
- c. Streams/stream buffers
 - Field observation and verification
- d. Slopes exceeding 25 percent over a 10-foot rise in elevation
 - United States Geologic Survey Topographic Quadrangle Map
 - Field observation and verification
- e. Vegetation
 - United States Department of Agriculture, Nature Resource Conservation Service
 - Field observation
- f. Wildlife Species (including fish)
 - United States Fish and Wildlife Service
 - Georgia Department of Natural Services, Wildlife Resources Division, Natural Heritage Program
 - Field observation
- g. Archeological/Historical Sites
 - Historic Resources Survey
 - Georgia Department of Natural Resources, Historic Preservation Division
 - Field observation and verification

ENVIRONMENTAL SITE ANALYSIS FORM (CONTINUED)

3. **PROJECT IMPLEMENTATION MEASURES**. Describe how the project implements each of the measures listed below as applicable. Indicate specific implementation measures required to protect environmental site feature(s) that may be impacted.

- a. Protection of environmentally sensitive areas, i.e., floodplain, slopes exceeding 25 percent, river corridors.
- b. Protection of water quality
- c. Minimization of negative impacts on existing infrastructure
- d. Minimization on archeological/historically significant areas
- e. Minimization of negative impacts on environmentally stressed communities where environmentally stressed communities are defined as communities exposed to a minimum of two environmentally adverse conditions resulting from public and private municipal (e.g., solid waste and wastewater treatment facilities, utilities, airports, and railroads) and industrial (e.g., landfills, quarries and manufacturing facilities) uses.
- f. Creation and preservation of green space and open space
- g. Protection of citizens from the negative impacts of noise and lighting
- h. Protection of parks and recreational green space
- i. Minimization of impacts to wildlife habitats

DISCLOSURE REPORT FORM

WITHIN THE (2) YEARS IMMEDIATELY PRECEDING THE FILING OF THIS ZONING PETITION HAVE YOU, AS THE APPLICANT OR OPPONENT FOR THE REZONING PETITION, OR AN ATTORNEY OR AGENT OF THE APPLICANT OR OPPONENT FOR THE REZONING PETITION, MADE ANY CAMPAIGN CONTRIBUTIONS AGGREGATING \$250.00 OR MORE OR MADE GIFTS HAVING AN AGGREGATE VALUE OF \$250.00 TO THE MAYOR OR ANY MEMBER OF THE CITY COUNCIL.

CIRCLE ONE:

YES (if YES, complete points 1 through 4);

NO (if NO, complete only point 4)

1. **CIRCLE ONE:** **Party to Petition** (If party to petition, complete sections 2, 3 and 4 below)

In Opposition to Petition (If in opposition, proceed to sections 3 and 4 below)

2. List all individuals or business entities which have an ownership interest in the property which is the subject of this rezoning petition:

1.

5.

2.

6.

3.

7.

4.

8.

3. **CAMPAIGN CONTRIBUTIONS:**

Name of Government Official	Total Dollar Amount	Date of Contribution	Enumeration and Description of Gift Valued at \$250.00 or more

4. The undersigned acknowledges that this disclosure is made in accordance with the Official Code of Georgia, Section 36-67A-1 et. seq. Conflict of interest in zoning actions, and that the information set forth herein is true to the undersigned's best knowledge, information and belief.

Name (print) Jennifer Santelli

Signature: *J. Santelli*

Date: August 5, 2021

DISCLOSURE REPORT FORM

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2. _____	6. _____
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Name (print) Bridgette Ganter

Signature: Bridgette Ganter

Date: 8/13/21

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CITY OF TUCKER

03/18/2022

PLANNING & ZONING
DEPARTMENT

DISCLOSURE REPORT FORM

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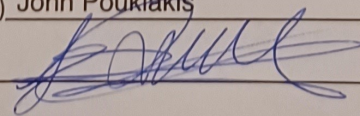
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Name (print) John Pouklakis

Signature: 

Date: 8/11/21

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03/18/2022
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DEPARTMENT

SLUP-21-0004, CV-21-0002, CV-21-0003, CV-21-0004, CV-22-0006

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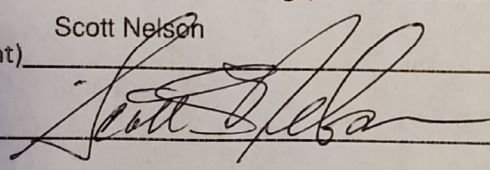
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Name (print) Scott Nelson

Signature: 

Date: 3/14/22

SLUP-21-0004, CV-21-0002, CV-21-0003, CV-21-0004, CV-22-0006

LAND USE PETITION APPLICATION - REVISED DECEMBER 2021

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PROPERTY OWNER'S CERTIFICATION

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(RZ, CA, SLUP, M, CV) (Address)

on this date _____, 20_____
(Month) (Day)

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Scott Nelson
Signature of Property Owner

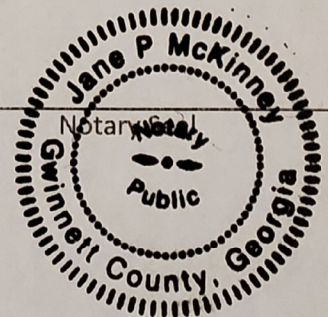
3/14/22
Date

Scott Nelson

Type or Print Name and Title

Jane P. McKinney
Signature of Notary Public

3/14/22
Date



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03/18/2022

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SITE PLAN CHECKLIST

All items must be included on the Site Plan; separate Site Plans may be necessary to address all items

1. Key and/or legend and site location map with North arrow
2. Boundary survey of subject property which includes dimensions along property lines that match the metes and bounds of the property's written legal description and clearly indicates the point of beginning
3. Acreage of subject property
4. Location of land lot lines and identification of land lots
5. Existing, proposed new dedicated and future reserved rights-of-way of all streets, roads, and railroads adjacent to and on the subject property
6. Proposed streets on the subject site
7. Posted speed limits on all adjoining roads
8. Current zoning of the subject site and adjoining property
9. Existing buildings with square footages and heights (stories), wells, driveways, fences, cell towers, and any other structures or improvements on the subject property
10. Existing buildings with square footages and heights (stories), wells, driveways, fences, cell towers, and any other structures or improvement or adjacent properties within 400 feet of the subject site based on the City's aerial photography or an acceptable substitute as approved by the Director
11. Location of proposed buildings (except single family residential lots) with total square footage
12. Layout and minimum lot size of proposed single family residential lots
13. Topography (surveyed or City) on subject site and adjacent property within 200 feet as required to assess runoff effects
14. Location of overhead and underground electrical and pipeline transmission/conveyance lines
15. Required and/or proposed setbacks
16. 100 year flood plain horizontal limits and flood zone designations as shown on survey or FEMA FIRM maps
17. Required landscape strips, undisturbed buffers, and any other natural areas as required or proposed
18. Required and proposed parking spaces; Loading and unloading facilities
19. Lakes, streams, and waters on the state and associated buffers
20. Proposed stormwater management facilities
21. Community wastewater facilities including preliminary areas reserved for septic drain fields and points of access
22. Availability of water system and sanitary sewer system
23. Tree lines, woodlands and open fields on subject site
24. Entrance site distance profile assuming the driver's eye at a height of 3.5 feet
25. Wetlands shown on the County's GIS maps or survey.
26. Mail kiosk location.

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LAND USE PETITION CALENDAR

*Application Deadline	Planning Commission	M&CC 1st Read	M&CC 2nd Read
11/9/2020	12/17/2020	1/11/2021	2/8/2021
12/14/2020	1/21/2021	2/8/2021	3/8/2021
1/11/2021	2/18/2021	3/8/2021	4/12/2021
2/8/2021	3/18/2021	4/12/2021	5/10/2021
3/8/2021	4/15/2021	5/10/2021	6/14/2021
4/12/2021	5/20/2021	6/14/2021	7/12/2021
5/10/2021	6/17/2021	7/12/2021	8/9/2021
6/14/2021	7/15/2021	8/9/2021	9/13/2021
7/12/2021	8/19/2021	9/13/2021	10/12/2021
8/9/2021	9/16/2021	10/12/2021	11/8/2021
9/13/2021	10/21/2021	11/8/2021	12/13/2021
10/12/2021	11/18/2021	12/13/2021	TBD
11/8/2021	12/16/2021	TBD	TBD

*Incomplete applications will not be accepted.

PUBLIC PARTICIPATION PLAN AND REPORT

See separate document.

PUBLIC NOTICE REQUIREMENTS

Sec. 46-1526 details the public notice requirements for land use petitions, which include public notice sign(s), advertisement in The Champion newspaper, and written notice to everyone within 500'.

- The applicant is responsible for posting the public notice sign(s). City of Tucker Staff will order the signs(s) and provide the required timeframe for posting.
- The City of Tucker is responsible for placing the legal ad in The Champion newspaper
- The City of Tucker is responsible for mailing the written notification to surrounding property owners.

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PROPERTY COMPLIANCE

All Occupational Tax payments must be paid in-full and any and all outstanding code violations on the property must be rectified prior to the public hearing.

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Concurrent Variance Criteria

**Chick-fil-A Tucker
4435 Hugh Howell Road
Tucker, GA 30084**

VARIANCE #1 REQUEST: ALLOW DRIVE-THROUGH FACILITY BETWEEN STREET AND BUILDING

Section 46-1166 of the City of Tucker municipal code prohibits the locations of drive-through restaurant facilities between the building and the street in the DT-2 Downtown Corridor zoning district.

Criteria in support of Chick-fil-A's site layout, which locates drive-through facilities between the building and Hugh Howell Road, as well as Rosser Terrace Road:

- a. *By reason of exceptional narrowness, shallowness, or shape of a specific lot, or by reason of exceptional topographic and other site conditions (such as, but not limited to, floodplain, major stand of trees, steep slope), which were not created by the owner or applicant, the strict application of the requirements of this division would deprive the property owner of rights and privileges enjoyed by other property owners in the same zoning district.*

The subject parcel abuts Hugh Howell Road to the north, Rosser Terrace to the east and residentially zoned properties to the west and south. Section 46-1166 requires that drive-through restaurant facilities be located a minimum of 60 feet from residentially zoned parcels. Since the lot is rectangular, the available area for the drive-through is confined to a narrow section in the center of the parcel. This configuration does not provide adequate space for vehicles to circulate and greatly diminishes the available length for drive-through queue. The geometry of the parcel and the zoning designation of the adjacent parcels were not created by the owner or applicant. Strict application of these requirements will deprive Chick-fil-A of an efficient drive-through operation, which is enjoyed by nearby property owners whose businesses are not located at street intersections and do not abut residential properties.

- b. *The requested variance does not go beyond the minimum necessary to afford relief, and does not constitute a grant of special privilege inconsistent with the limitations upon other properties in the zoning district in which the subject property is located.*

Request of this variance does not go beyond the minimum necessary to afford relief since drive-through design is adhering to City of Tucker ordinance requirements as much as possible. The proposed drive-through facilities are a minimum of 60 feet from residentially zoned adjacent properties and provide a bypass lane, in addition to the extra lane design employed by Chick-fil-A. Chick-fil-A will provide a vegetative screen designed to block vehicles from view, while keeping the building visible. Special privilege is not being granted.

- c. *The grant of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the zoning district in which the subject property is located.*

Grant of this variance to allow drive-through facilities between the building and streets will not be detrimental to the public, however it will allow drive-through operations to proceed expediently according to the design principles Chick-fil-A has researched and is implementing across the country to ensure that adequate stack is provided in drive-through lanes and that vehicles may enter, be served, and exit as quickly as possible without queue spill over into adjacent roadways. Chick-fil-A has a history and reputation for maintaining properties to very high standards and will be an asset to the community.

- d. *The literal interpretation and strict application of the applicable provisions or requirements of this division would cause undue and unnecessary hardship.*

Literal interpretation and strict application of the requirement that prohibits drive-through facilities between the building and street would prohibit Chick-fil-A from operating a drive-through on this parcel.

- e. *The requested variance would be consistent with the spirit and purpose of this division and the comprehensive plan text.*

The requested variance is the minimum necessary to afford relief, while maintaining the spirit and purpose of the DT-2 zoning district intent to provide a mixed-use community, with a focus on walkability and pedestrian access. Chick-fil-A proposes to locate drive-through facilities as far as possible from adjacent residential parcels and is proposing two patio areas near the street with sidewalk connectivity to the street to promote community and walkability.

VARIANCE #2 REQUEST: RELIEF FROM MAXIMUM BUILDING SETBACKS FROM HUGH HOWELL ROAD AND
ROSSER TERRACE

Section 46-986 and Table 3.2 of the City of Tucker municipal code require a maximum building setback of 20 feet from Hugh Howell Road and Rosser Terrace in the DT-2 Downtown Corridor zoning district.

Criteria in support of Chick-fil-A's site layout proposing a building setback of 45 feet from Hugh Howell Road and 65 feet from Rosser Terrace:

- a. *By reason of exceptional narrowness, shallowness, or shape of a specific lot, or by reason of exceptional topographic and other site conditions (such as, but not limited to, floodplain, major stand of trees, steep slope), which were not created by the owner or applicant, the strict application of the requirements of this division would deprive the property owner of rights and privileges enjoyed by other property owners in the same zoning district.*

Due to the geometry of the parcel and adjacent residential parcels, the proposed drive-through is located between the building and both Hugh Howell Road and Rosser Terrace. Chick-fil-A's dual lane drive-through design serves customers efficiently and prevents queue spill on to adjacent roadways. The dual lane drive-throughs are a minimum of 20 feet in width. In addition, Section 46-1166 requires that all drive-through restaurant facilities provide an additional bypass lane. The extra lane, in addition to a 5 feet landscape buffer prohibit movement of the building closer to Hugh Howell Road.

Likewise, the same drive-through lanes travel between the building and Rosser Terrace. The building setback is greater in this instance because a patio and sidewalk are provided for street connectivity.

The geometry of the parcel and the zoning designation of the adjacent parcels were not created by the owner or applicant. Strict application of these requirements will deprive Chick-fil-A of an efficient drive-through operation, which is enjoyed by nearby property owners who do have locations at street intersections and abut residential properties.

- b. *The requested variance does not go beyond the minimum necessary to afford relief, and does not constitute a grant of special privilege inconsistent with the limitations upon other properties in the zoning district in which the subject property is located.*

Request of this variance does not go beyond the minimum necessary to afford relief as drive-through design is adhering to City of Tucker ordinance requirements as much as possible. The proposed drive-through facilities are a minimum of 60 feet from residentially zoned adjacent properties and provide a bypass lane, in addition to the extra lane design employed by Chick-fil-A. Chick-fil-A is proposing two patios near the streets in keeping with the spirit and intent of the ordinance to promote community, walkability, and connection to the City streets.

- c. *The grant of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the zoning district in which the subject property is located.*

Granting of this variance to exceed the maximum building setbacks will not be detrimental to the public, however it will allow drive-through operations to proceed expediently according to the design

principles Chick-fil-A has researched and is implementing across the country to ensure that adequate stack is provided in drive-through lanes and that vehicles may enter, be served, and exit as quickly as possible to avoid queue spill over into adjacent roadways. Chick-fil-A is providing two outdoor dining patios with sidewalk connectivity to the Hugh Howell streetscape to promote community and walkability.

- d. *The literal interpretation and strict application of the applicable provisions or requirements of this division would cause undue and unnecessary hardship.*

Literal interpretation and strict application of the requirement would severely diminish drive-through efficiency due to decreased stack length if the drive-through lanes were to be located at the interior of the site. Spatially, two drive-through lanes, a bypass lane, and landscape buffer will not fit into a 25 feet setback, so strict adherence would force diminished drive-through efficiency.

- e. *The requested variance would be consistent with the spirit and purpose of this division and the comprehensive plan text.*

The requested variance is the minimum necessary to afford relief, while maintaining the spirit and purpose of the DT-2 zoning district intent to provide a mixed-use community, with a focus on walkability and pedestrian access. Chick-fil-A proposes to locate drive-through facilities as far as possible from adjacent residential parcels and is proposing two patio areas near the street with sidewalk connectivity to the street to promote community and walkability.

VARIANCE #3 REQUEST: RELIEF FROM INTERPARCEL ACCESS

Section 46-989 of the City of Tucker municipal code requires inter-parcel access between abutting properties in the DT-2 Downtown Corridor zoning district

Criteria in support of Chick-fil-A's site layout, which does not provide inter-parcel access with abutting parcel.

- a. *By reason of exceptional narrowness, shallowness, or shape of a specific lot, or by reason of exceptional topographic and other site conditions (such as, but not limited to, floodplain, major stand of trees, steep slope), which were not created by the owner or applicant, the strict application of the requirements of this division would deprive the property owner of rights and privileges enjoyed by other property owners in the same zoning district.*

Due to the geometry of the parcel and adjacent residential parcels, the proposed drive-through is located between the building and both Hugh Howell Road and Rosser Terrace. Chick-fil-A's dual lane, isolated drive-through design serves customers efficiently and prevents queue spill on to adjacent roadways. Since the parcel is rectangular with the smallest length frontage along Hugh Howell Road, space does not exist for a drive to provide inter-parcel access outside of the drive-through lanes. Due to the geometry of the parcel, inter-parcel access would need to be achieved by allowing vehicles to enter the drive-through near the order pick up point, which would greatly diminish drive-through efficiency. Inter-parcel access currently does not exist on this site. The constraints of the lot were not created by the owner or the applicant. Strict adherence to the requirement for inter-parcel access deprives Chick-fil-A of an efficient drive-through.

- b. *The requested variance does not go beyond the minimum necessary to afford relief, and does not constitute a grant of special privilege inconsistent with the limitations upon other properties in the zoning district in which the subject property is located.*

Request of this variance does not go beyond the minimum necessary to afford relief as drive-through design is adhering to City of Tucker ordinance requirements as much as possible. The proposed drive-through facilities are a minimum of 60 feet from residentially zoned adjacent properties and provide a bypass lane, in addition to the extra lane design employed by Chick-fil-A.

- c. *The grant of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the zoning district in which the subject property is located.*

Granting of this variance for relief from inter-parcel access will not be detrimental to the public, however it will allow drive-through operations to proceed expediently according to the design principles Chick-fil-A has researched and is implementing across the country to ensure that adequate stack is provided in drive-through lanes and that vehicles may enter, be served, and exit as quickly as possible to avoid queue spill over into adjacent roadways. Inter-parcel access does not currently exist. Additionally, the current access off Rosser Terrace moves Chick-fil-A trips off Hugh Howell Road. If inter-parcel access were provided at the west adjacent parcel, vehicles bound for Chick-fil-A could enter the site from Hugh Howell Road through the adjacent parcel.

- d. *The literal interpretation and strict application of the applicable provisions or requirements of this division would cause undue and unnecessary hardship.*

Literal interpretation and strict application of the requirement would severely diminish drive-through efficiency due to decreased stack length if the drive-through lanes were to be located at the interior of the site. Spatially, two drive-through lanes, a bypass lane, and landscape buffer will not fit into the frontage provided on Hugh Howell Road, so strict adherence would force diminished drive-through efficiency.

- e. *The requested variance would be consistent with the spirit and purpose of this division and the comprehensive plan text.*

The requested variance maintains the spirit and purpose of the DT-2 zoning district intent through proposed patio areas and sidewalk and street connectivity for pedestrians. Relief from the requirement to provide inter-parcel access allows Chick-fil-A to operate an efficient drive-through that avoids queue migration to adjacent parcels and roadways.

VARIANCE #4 REQUEST: RELIEF FROM RESIDENTIAL TRANSITIONAL BUFFER

Section 46-1338 of the City of Tucker municipal code requires a 50 feet transitional buffer between residentially zoned properties and commercially zoned properties. The buffer must consist of natural or planted screening material. Chick-fil-A is requesting a variance to reduce the required buffer to 29 feet.

Criteria in support of Chick-fil-A's site layout, which reduces the required transitional buffer from 50 feet to 29 feet:

- a. *By reason of exceptional narrowness, shallowness, or shape of a specific lot, or by reason of exceptional topographic and other site conditions (such as, but not limited to, floodplain, major stand of trees, steep slope), which were not created by the owner or applicant, the strict application of the requirements of this division would deprive the property owner of rights and privileges enjoyed by other property owners in the same zoning district.*

The parcel width is only 50.9 feet where it is adjacent to a residentially zoned property at 2233 Dillard St. The 50 feet transitional buffer requirement precludes any use or improvement. The constraints of the lot were not created by the owner or the applicant. Strict adherence to the requirement for a 50 feet transitional buffer deprives Chick-fil-A of use of this portion of property, including a proposed access on Dillard St.

- b. *The requested variance does not go beyond the minimum necessary to afford relief, and does not constitute a grant of special privilege inconsistent with the limitations upon other properties in the zoning district in which the subject property is located.*

Request of this variance does not go beyond the minimum necessary as the minimum width needed for a driveway, 25 feet (with curb), is placed as far from the residential zoned property as possible, allowing a transitional buffer of 29 feet.

- c. *The grant of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the zoning district in which the subject property is located.*

Granting partial relief from the transitional buffer requirement will not be detrimental to the public, as Chick-fil-A's building and drive-through operations are not located within 50 feet of residentially zoned properties. Additionally, Chick-fil-A will provide and maintain professional landscaping and screening according to City of Tucker municipal code Section 46-1338.

- d. *The literal interpretation and strict application of the applicable provisions or requirements of this division would cause undue and unnecessary hardship.*

Literal interpretation and strict application of the requirement would severely diminish use of the property to allow an access to Dillard St and the traffic signal at Cowan Rd.

- e. *The requested variance would be consistent with the spirit and purpose of this division and the comprehensive plan text.*

The requested variance maintains the spirit and purpose of the ordinance by providing a substantial residential buffer and locating the commercial building, drive-through facilities, and parking at least 50 feet from residentially zoned properties.

TRAFFIC IMPACT STUDY

Chick-fil-A # 04959 Tucker
4431 Hugh Howell Rd,
Tucker, Georgia

March 15, 2022

Prepared for:
Chick-fil-A, Inc.

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DEPARTMENT

Bowman

TRAFFIC IMPACT STUDY

Chick-fil-A # 04959 Tucker
4431 Hugh Howell Rd,
Tucker, Georgia

March 15, 2022

Prepared for:
Chick-fil-A, Inc.

Bowman

Traffic Impact Study

Chick-fil-A # 04959 Tucker

4431 Hugh Howell Rd,
Tucker, Georgia

Prepared March 15, 2022

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03/15/2022
Bowman Job # 120005-01-049

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Appendix B: Scope/Methodology
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Executive Summary

This report summarizes the findings of the Traffic Impact Study performed by Bowman Consulting (Bowman) for the proposed 4,989 SF Chick-fil-A development with 40 Car Stack Chick-fil-A development to be located at the Southwest corner of the intersection of Hugh Howell Rd and Rosser Terrace in the City of Tucker, Georgia.

Access to the site will be provided by one (1) right-in only driveway along Rosser Terrace and one (1) full-access driveway along Dillard St.

The purpose of this study is threefold: (i) to determine the number of expected trips generated by the proposed site; (ii) to determine the potential impact, if any, of the proposed development on the surrounding roadway network; and (iii) to propose improvements to mitigate the impact of the proposed development, if required.

A Traffic Impact Analysis Methodology Statement was prepared and shared with representatives from the City of Tucker and the Georgia Department of Transportation.

Turning movement counts were collected for the morning and evening peak hours at the intersections of Hugh Howell Rd & Cowan Rd, Hugh Howell Rd & Rosser Terrace, Hugh Howell Rd & Tucker Industrial Rd, and Cowan Rd & Dillard St.

Based on the results of the trip generation assessment prepared by Bowman Consulting, the proposed development is expected to generate a total of 261 trips during the morning peak hour and 285 trips during the evening peak hour. It is anticipated that during the morning peak hour 128 of these are existing trips, the remaining 133 are expected to be primary trips. During the evening peak hour, it is anticipated that 143 are existing trips and 142 are new trips.

For the purposes of this analysis, it is anticipated that the proposed development will be constructed and fully operational by the year 2023.

The following scenarios were evaluated as part of this study: 2023 No Build, 2023 Build and 2023 Build with Improvements.

A Turn Lane Warrant Analysis was conducted based on the City of Tucker Code of Ordinances Sec. 22-284 - *Access Management*. The results show a right turn lane is warranted at the eastbound approach of the intersection of Hugh Howell Rd and Rosser Terrace.

Capacity Analyses comparison No Build Vs Build conditions were conducted for the analysis intersections to identify areas impacted by the proposed development. The results indicate the following:

- During the morning peak hour: all intersections are projected to operate at an acceptable overall LOS B or better during the No Build and Build Conditions. No changes in LOS and minimal increases in delays are expected on all approaches of the analysis intersection.
- During the evening peak hour: all intersections are projected to operate at an acceptable overall LOS C or better during the No Build and Build Conditions.

The northbound approach of the intersection of Hugh Howell Rd with Cowan Rd is expected to degrade from LOS E under No Build Conditions to LOS F under Build Conditions, with an increase in delay of 10.6 seconds.

Based on the results of the capacity and turn lane warrant analysis the following improvements are proposed:

- Optimize signal timings at Intersection of Hugh Howell Rd & Cowan Rd during evening Peak Hour.
- Provide an eastbound right-turning lane at the intersection of Hugh Howell Rd & Rosser Terrace.

Capacity Analyses comparison No Build Vs Build Improved conditions were conducted for the analysis intersections to evaluate the proposed improvements. The results indicate the following:

- During the morning peak hour: The intersection of Hugh Howell Rd and Rosser Terrace is expected to experience acceptable overall LOS A under Build Improved conditions. All approaches and turning movements are expected to maintain acceptable LOS.
- During the evening peak hour: The intersection of Hugh Howell Rd and Rosser Terrace is expected to experience acceptable overall LOS A under Build Improved conditions. All approaches and turning movements are expected to maintain acceptable LOS.

The intersection of Hugh Howell Rd and Cowan Rd/The Centre Driveway is expected to experience acceptable overall LOS C under Build Improved conditions. The northbound approach is anticipated to operate at LOS E under both No Build and Build Improved Conditions with no increase in delay. All other approaches and movements in this intersection are anticipated to operate at acceptable LOS D or better under Build Improved Conditions.

Based on the results of the capacity, turn lane and queueing analysis, the proposed Chick-Fil-A at 4431 Hugh Howell Rd, Tucker, GA is not expected to adversely impact the surrounding roadway network provided the proposed improvements mentioned on this report.

1. Introduction

This report summarizes the findings of the Traffic Impact Study performed by Bowman Consulting (Bowman) for the proposed Chick-fil-A development to be located at the Southwest corner of the intersection of Hugh Howell Rd and Rosser Terrace in the City of Tucker, Georgia.

The purpose of this study is threefold: (i) to determine the number of expected trips generated by the proposed site; (ii) to determine the potential impact, if any, of the proposed development on the surrounding roadway network; and (iii) to propose improvements to mitigate the impact of the proposed development, if required.

2. Background Information

The proposed development entails a 4,989 SF Chick-fil-A development with 40 Car Stack to be constructed at 4431 Hugh Howell Rd, in the City of Tucker, Georgia. **Figure 1** depicts the site location.



Figure 1. Site location.

Access to the development will be provided by one (1) right-in only driveway along Rosser Terrace and one (1) full-access driveway along Dillard St, no access driveways are proposed on Hugh Howell Rd. The latest Concept Plan is presented in **Appendix A**.

Traffic Impact Analysis Methodology

A Traffic Impact Analysis Methodology Statement was prepared and shared with representatives from the City of Tucker and the GDOT DeKalb County Division. A copy of the approved Traffic Impact Analysis Methodology Statement and proof of the coordination is contained in **Appendix B**.

To assess the traffic operation at the study Intersections, the following tasks were undertaken:

- Turning movement counts were collected during an average weekday for the morning (7:00 AM – 9:00 AM) and evening (4:00 PM – 6:00 PM) peak periods.
- Trip generation Assessment for Chick-Fil-a (CFA) facilities.
- Trip Distribution for the proposed development.
- Capacity and queuing analyses at study intersections.

3. Roadway Network

Hugh Howell Rd (GA 236): Within the identified study area is a State-maintained four-lane Minor Arterial according to the Georgia Department of Transportation State Functional Classification Map Online. Hugh Howell Rd has a continuous two-way left-turn lane (TWLTL), a southeast-northwest alignment and a posted speed limit of 45 miles per hour.

Rosser Terrace: Within the identified study area is a city-maintained two-lane undivided roadway identified as a Local Road according to the City of Tucker 2019, Strategic Transportation Master Plan. Rosser Terrace has a north-south alignment and a posted speed limit of 25 miles per hour.

Tucker Industrial Rd: Within the identified study area is a city-maintained two-lane undivided roadway identified as a Local Road according to the City of Tucker Strategic 2019, Transportation Master Plan. Tucker Industrial Rd has a north-south alignment with a posted speed limit of 35 miles per hour.

Cowan Rd: Within the identified study area is a city-maintained two-lane undivided roadway identified as a Local Road according to the City of Tucker 2019, Strategic Transportation Master Plan. Cowan Rd has a northeast-southwest alignment with a posted speed limit of 25 miles per hour.

Dillard St: Within the identified study area is a city-maintained two-lane undivided roadway identified as a Local Road according to the City of Tucker 2019, Strategic Transportation Master Plan. Dillard St has a north-south alignment with a posted speed limit of 25 miles per hour.

Intersection Characteristics

1. Intersection of Hugh Howell Rd and Rosser Terrace/Fuller Way

This intersection is currently a four-legged unsignalized intersection where Hugh Howell Rd has a southeast-northwest alignment and Rosser Terrace and Fuller way have a north-south alignment.

The northwest approach (Hugh Howell Road eastbound) consists of an exclusive through lane, one shared through/right-turn lane and a continuous TWLTL. The southeast approach (Hugh Howell Road westbound) consists of two exclusive through lanes, one exclusive right-turn lane and a continuous TWLTL. The northbound approach (Rosser Terrace) consists of one shared left-turn/through/right-turn lane. The southbound approach (Fuller Way) consists of one shared left-turn/through/right-turn lane.

2. Intersection of Hugh Howell Rd and Cowan Rd/The Centre Driveway

This intersection is currently a four-legged signalized intersection where Hugh Howell Rd has a southeast-northwest alignment and Cowan Rd has a northeast-southwest alignment.

The northwest approach (Hugh Howell Road eastbound) consists of one exclusive left-turn lane, one exclusive through lane, and one shared through/right-turn lane. The southeast approach (Hugh Howell Road westbound) consists of one exclusive left-turn lane, two exclusive through lanes, and one exclusive right-turn lane. The southwest approach (Cowan Road Northbound) consists of one shared left-turn/through/right-turn lane. The northeast approach (Publix Driveway southbound) consists of one exclusive left-turn lane, and one shared through/right-turn lane.

3. Intersection of Hugh Howell Rd and Tucker Industrial Rd

This intersection is currently a four-legged signalized intersection where Hugh Howell Rd has an east-west alignment and Tucker Industrial Rd has a north-south alignment.

The eastbound and westbound approaches consist of one exclusive left-turn lane, one exclusive through lane, and one shared through/right-turn lane. The northbound and southbound approaches have one shared left-turn/through/right-turn lane.

4. Intersection of Cowan Rd & Dillard St

This intersection is currently a three-legged unsignalized intersection where Hugh Howell Rd has a northeast-southwest alignment and Dillard St has a north-south alignment.

The northeast approach consists of a single lane with left-turn and through movements allowed. The southwest approach consists of a single lane with through and right-turn movements allowed. The northbound approach consists of a single lane with left-turn and right-turn movements allowed.

Proposed conditions.

As mentioned before, access to the development will be provided by one (1) right-in driveway along Rosser Terrace and one (1) full-access driveway along Dillard St. No access is proposed on Hugh Howell Road.

4. Data Collection

For the purposes of this study the following data was collected:

- Inspections were conducted to obtain an inventory of existing roadway geometry, traffic control devices, and location of existing and proposed driveways.
- Published GDOT AADT counts and functional classification information.
- Turning movement counts were collected at the following intersections:
 - Hugh Howell Rd and Cowan Rd
 - Hugh Howell Rd and Rosser Terrace
 - Hugh Howell Rd and Tucker Industrial Rd
 - Cowan Rd & Dillard St

The traffic counts were completed during an average weekday, Tuesday, June 15, 2021, for the intersections of Hugh Howell Rd with Cowan Rd, Rosser Terrace, and Tucker Industrial Rd, and on Tuesday, March 1, 2022, for the intersection of Cowan Rd with Dillard St for the morning (7:00 AM – 9:00 AM) and evening (4:00 PM – 6:00 PM) peak periods. The turning movement counts are presented in **Appendix C**.

5. Traffic Forecast and Background Traffic

For the purposes of this analysis, it is anticipated that the proposed development will be constructed and fully operational by the year 2023. The following scenarios were evaluated as part of this study:

- Future Conditions (2023) without the proposed development (No Build)
- Future Conditions (2023) with the proposed development (Build)
- Improved Future Conditions (2023) with the proposed development (Build with Improvements)

To develop the 2022 and the 2023 traffic volumes, the first step was to determine a background growth rate applicable for the study area roadway segments. For each roadway segment, the annual growth rate was calculated using the historical AADT information provided by the GDOT Average Annual Daily Traffic & Historical Counts 2015-2019 information. A 0.5% minimum average annual growth rate was used for all traffic in the study area.

The historical study area roadway AADT information, as well as the applied growth rates utilized for the analysis, are presented in **Table 1**.

Table 1 Historical AADT and Annual Growth Rates

Roadway	From	to	2015	2016	2017	2018	2019	2016	2017	2018	2019	Avg Growth rate	Applied Growth rate
Hugh Howell Rd	Lawrenceville Hwy	Mountain Industrial Blvd	21,700	22,400	25,600	25,600	24,400	3.2%	14.3%	0.0%	-4.7%	3.2%	3.2%
Rosser Terrace	N/A	N/A	-	-	-	-	-	-	-	-	-	No Data	0.5%
Tucker Industrial Rd	N/A	N/A	-	-	-	-	-	-	-	-	-	No Data	0.5%
Cowan Rd	N/A	N/A	-	-	-	-	-	-	-	-	-	No Data	0.5%
Dillard St	N/A	N/A	-	-	-	-	-	-	-	-	-	No Data	0.5%

Source: GDOT Average Annual Daily Traffic & Historical Counts 2015-2019

The growth rates presented in **Table 1** were applied to the 2021 Turning Movement Counts to develop the 2022 Existing Volumes. The 2022 Existing Traffic Volumes are presented in **Appendix D, Exhibit 1**.

The 2023 No Build Traffic Volumes were developed applying one year growth to the 2022 Existing Traffic Volumes, see **Exhibit 2** in **Appendix D**.

6. Trip Generation

The applicant is proposing to develop the site with the following land uses generating site traffic:

- 4,989 SF Chick-fil-A Restaurant with drive-thru window (Proposed)

Considering Chick-fil-A fast-food restaurants generate larger number of trips than ITE comparable land uses. Bowman conducted a Trip Generation Assessment based on trip generation data provided by the Atlanta Department of Transportation for three similar Chick-fil-A facilities. The trip generation assessment is presented **Appendix E**.

Table 2 displays the trip generation for the proposed development and includes the morning and evening peak hour.

Table 2 Site Trip Generation

Land Use	Land Use Code ⁽¹⁾	AADT of Adjacent Street	Daily Trips ⁽¹⁾	Period	Peak Hour Trips ⁽²⁾			Pass by ⁽³⁾			Primary		
					In	Out	Total	In	Out	Total	In	Out	Total
Fast Food restaurant with Drive thru	934	24,400	2,350	AM	133	128	261	65	63	128	68	65	133
				PM	148	137	285	74	69	143	74	68	142

(1) Based on the Institute of Transportation Engineers Trip Generation, 10th Edition

(2) Based on Bowman 2021 Trip Generation Assessment for Chick-Fil-A facilities

(3) Pass-By rates of 49% were extracted from the Institute of Transportation Engineers Trip Generation Handbook, 3rd Edition

The proposed development is expected to generate a total of 261 trips during the morning peak hour and 285 trips during the evening peak hour. It is anticipated that during the morning peak hour 128 of these are existing trips, the remaining 133 are expected to be primary trips. During the evening peak hour, it is anticipated that 143 are existing trips and 142 are new trips.

7. Trip Distribution

The proposed trip distribution for the site was developed based on the AADT information of the surrounding roadway network, the population and employment centers in the area, and the access conditions of the site. The trip distribution for this site is presented in **Figure 2**.



Figure 2. Trip Distribution

The Primary and Pass-By trip distributions are presented in **Exhibits 3** and **4** in **Appendix D**.

The Primary and Pass-By trips are presented in **Exhibits 5** and **6** in **Appendix D**.

The CFA Site Trips are presented in **Exhibits 7** in **Appendix D**.

The CFA Site Trips were added to the 2022 No Build Traffic Volumes to yield the 2022 Build Traffic Volumes presented in **Exhibit 8** in **Appendix D**.

8. Turn Lane Warrant Analysis

A Turn Lane Warrant Analysis was conducted based on the City of Tucker Code of Ordinances. Per Sec. 22-284 - *Access Management*, a deceleration lane shall be required at each project driveway or subdivision street entrance, as applicable, that meets either the average daily traffic (ADT) or right turning volumes shown in **Table 3**.

Table 3 Right Turn Lane Warrant Criteria

Main Road Speed Limit	2 Lanes on Main Road		>2 Lanes on Main Road	
	35-40 mph	>40 mph	35-40 mph	>40 mph
Main Road ADT	8000	4000	12000	10000
Daily Right Turning Volume	150	75	150	75
Peak Hour Right Turning Volumes	15	7	15	7

For driveways, right-turn lanes shall be required at all driveways where the right-turning volume exceeds 300 vehicles per day.

The following number of entering right turns are anticipated at each unsignalized intersection/driveway under 2023 Build Conditions:

- Hugh Howell Rd and Rosser Terrace
 - AM Peak Hour - 13
 - PM Peak Hour - 29
- Cowan Rd and Dillard St
 - AM Peak Hour - 29
 - PM Peak Hour - 35
- Rosser Terrace and Site Driveway 1
 - AM Peak Hour - 73
 - PM Peak Hour - 81

Based on the thresholds for a right-turn lane provided on the City of Tucker Code of Ordinances, a right turn lane is warranted at the eastbound approach of the intersection of Hugh Howell Rd and Rosser Terrace.

Based on the posted speed limit of Cowan Rd, Dillard St and Rosser Terrace (25 mph) a right-turn deceleration lane is not warranted as the threshold is not applicable for roads with speed limits smaller than 35 mph.

9. Capacity Analysis

The study intersections were analyzed for each scenario following the Highway Capacity Manual (HCM 6th edition) methodologies using the computer software Synchro 10. The analysis uses capacity, Level of Service, and control delay as the criteria for the performance of the driveways.

Capacity, as defined by the HCM, is a measure of the maximum number of vehicles in an hour that can travel through an intersection or section of roadway under typical conditions. Level of Service (LOS) is a marker of the driving conditions and perception of drivers while traveling during the given time period. LOS ranges from LOS A which represents free flow conditions, to LOS F which represents breakdown conditions.

Table 4 shows the LOS for unsignalized intersections as defined by the HCM.

Table 4 HCM Level of Service Criteria

Level of Service (LOS)	Unsignalized Intersections	Signalized Intersections
	Average Control Delay (sec/veh)	Average Control Delay (sec/veh)
A	≤10	≤10
B	10 - 15	10 - 20
C	15 - 25	20 - 35
D	25 - 35	35 - 55
E	35 - 50	55 - 80
F	>50	>80

Control delay is a measure of the total amount of delay experienced by an individual vehicle and includes delay related to deceleration, queue delay, stopped delay, and acceleration.

Table 4 displays the amount of control delay (in seconds per vehicle) that corresponds to the LOS for signalized and unsignalized intersections.

Capacity Analysis Comparison – No Build vs Build Conditions (Year 2023)

Capacity Analyses were conducted for the No Build and Build conditions (year 2023). The primary purpose for this approach was to compare the results to identify areas impacted by the proposed development. The capacity results are included in **Appendix F**.

The capacity results for morning peak hour are summarized in **Table 5**.

Table 5 2022 AM Peak Hour Capacity Analysis

2023 CONDITIONS - (AM)			No Build		Build	
Intersection	Approach	Movement	DELAY (S)	LOS	DELAY (S)	LOS
1 Hugh Howell Rd & Rosser Terrace/Fuller Way	EB	L	8.3	A	8.2	A
		T	0.0	A	0.0	A
		TR	0.0	A	0.0	A
		Approach	0.5	A	0.5	A
	WB	L	0.0	A	7.8	A
		T	0.0	A	0.0	A
		R	0.0	A	0.0	A
		Approach	0.0	A	0.6	A
	NB	Approach	10.7	B	10.9	B
	SB	Approach	9.7	A	9.7	A
	Intersection	-	0.6	A	0.9	A
2 Hugh Howell Rd & Cowan Rd/The Centre Driveway	EB	L	4.4	A	7.6	A
		T	5.7	A	9.7	A
		TR	5.7	A	9.7	A
		Approach	5.6	A	9.5	A
	WB	L	4.9	A	8.3	A
		T	0.3	A	0.4	A
		R	0.0	A	0.1	A
		Approach	0.4	A	0.6	A
	NB	Approach	78.7	E	73.5	E
	SB	L	68.2	E	57.5	E
		TR	65.2	E	54.6	D
	SB	Approach	66.3	E	55.7	E
	Intersection	-	8.3	A	13.6	B
3 Hugh Howell Rd & Tucker Industrial Rd	EB	L	100.8	F	96.0	F
		T	0.3	A	0.3	A
		TR	0.3	A	0.3	A
		Approach	1.6	A	2.1	A
	WB	L	102.5	F	102.5	F
		T	5.2	A	5.6	A
		TR	5.2	A	5.6	A
		Approach	9.7	A	9.9	A
	NB	Approach	74.8	E	74.6	E
	SB	Approach	67.0	E	66.7	E
	Intersection	-	13.2	B	13.5	B
4 Cowan Rd & Dillard St	EB	Approach	0.0	A	0.0	A
	WB	Approach	0.9	A	3.4	A
	NB	Approach	8.9	A	10.1	B
	Intersection	-	1.7	A	5.7	A

Extracted from Synchro HCM 6th Edition

Based on the results of the capacity analysis during the morning peak hour, all intersections are projected to operate at an acceptable overall LOS B or better during the No Build and Build Conditions.

The northbound and southbound approaches of the intersection of Hugh Howell Rd and Cowan Rd are expected to operate at LOS E under both No Build and Build Conditions. The northbound and southbound approaches of the intersection of Hugh Howell Rd and Tucker Industrial Rd are expected to operate at LOS E under both No Build and Build Conditions. The eastbound and westbound left-turning movements of the intersection of Hugh Howell Rd with Tucker Industrial Rd are expected to operate at a LOS F during both No Build and Build Conditions, minimal increases in delays are expected at the above-mentioned turning movements and approaches.

The capacity results for evening peak hour are summarized in **Table 6**.

Table 6 2023 PM Peak Hour Capacity Analysis

2023 CONDITIONS - (PM)			No Build		Build	
Intersection	Approach	Movement	DELAY (S)	LOS	DELAY (S)	LOS
1 Hugh Howell Rd & Rosser Terrace/Fuller Way	EB	L	8.3	A	8.2	A
		T	0.0	A	0.0	A
		TR	0.0	A	0.0	A
		Approach	0.2	A	0.2	A
	WB	L	9.1	A	9.6	A
		T	0.0	A	0.0	A
		R	0.0	A	0.0	A
		Approach	0.0	A	0.7	A
	NB	Approach	15.2	C	16.7	C
	SB	Approach	10.2	B	10.1	B
2 Hugh Howell Rd & Cowan Rd/The Centre Driveway	Intersection -		0.5	A	0.8	A
	EB	L	9.3	A	13.7	B
		T	16.7	B	24.5	C
		TR	16.7	B	24.5	C
		Approach	15.9	B	23.4	C
	WB	L	12.1	B	18.1	B
		T	0.4	A	0.5	A
		R	0.2	A	0.2	A
		Approach	1.1	A	1.7	A
	NB	Approach	74.2	E	84.8	F
	SB	L	57.6	E	48.1	D
		TR	56.1	E	46.4	D
		Approach	56.7	E	47.1	D
3 Hugh Howell Rd & Tucker Industrial Rd	Intersection -		17.6	B	24.3	C
	EB	L	117.2	F	108.3	F
		T	1.7	A	1.8	A
		TR	1.7	A	1.8	A
		Approach	2.1	A	2.4	A
	WB	L	104.4	F	104.4	F
		T	8.0	A	8.4	A
		TR	8.0	A	8.4	A
		Approach	15.0	B	15.3	B
	NB	Approach	77.6	E	77.9	E
	SB	Approach	59.6	E	59.2	E
4 Cowan Rd & Dillard St	Intersection -		14.6	B	14.8	B
	EB	Approach	0.0	A	0.0	A
	WB	Approach	1.7	A	3.2	A
	NB	Approach	9.4	A	11.0	B
	Intersection -		1.7	A	4.7	A

Extracted from Synchro HCM 6th Edition

Based on the results of the capacity analysis during the evening peak hour, all intersections are projected to operate at an acceptable overall LOS C or better during the No Build and Build Conditions.

The northbound approach of the intersection of Hugh Howell Rd with Cowan Rd is expected to degrade from LOS E under No Build Conditions to LOS F under Build Conditions, with an increase in delay of 10.6 seconds.

The northbound and southbound approaches of the intersection of Hugh Howell Rd and Tucker Industrial Rd are expected to operate at LOS E under both No Build and Build Conditions; the eastbound and westbound left-turning movements of the intersection of Hugh Howell Rd with Tucker Industrial Rd are expected to operate at a LOS F during both No Build and Build Conditions, minimal increases in delays are expected at the above-mentioned turning movements and approaches.

Proposed Improvements

Based on the results of the capacity analysis comparison between No Build and Build Conditions, the following improvements are proposed:

- Optimize signal timings at Intersection of Hugh Howell Rd & Cowan Rd during evening Peak Hour.
- Provide an eastbound right-turning lane at the intersection of Hugh Howell Rd & Rosser Terrace.

Capacity Analysis Comparison – No Build vs Build Improved Conditions

A Capacity Analyses comparison was conducted for the No Build and Build Improved conditions (year 2023). The primary purpose for this approach was to compare the results in order to evaluate the effect of the proposed improvements. The capacity results are included in **Appendix F**.

The capacity results for morning peak hour are summarized in **Table 7**.

Table 7 2022 Morning Peak Hour Capacity Analysis Comparison No Build vs Improved Conditions

2023 CONDITIONS - (AM)			No Build		Build Improved	
Intersection	Approach	Movement	DELAY (S)	LOS	DELAY (S)	LOS
1 Hugh Howell Rd & Rosser Terrace/Fuller Way	EB	L	8.3	A	8.2	A
		T	0.0	A	0.0	A
		TR	0.0	A	0.0	A
		Approach	0.5	A	0.6	A
	WB	L	0.0	A	7.8	A
		T	0.0	A	0.0	A
		R	0.0	A	0.0	A
		Approach	0.0	A	0.6	A
	NB	Approach	10.7	B	10.9	B
	SB	Approach	9.7	A	9.7	A
	Intersection	-	0.6	A	0.9	A

Extracted from Synchro HCM 6th Edition

Based on the results of the capacity analysis, during the morning peak hour, the intersection of Hugh Howell Rd and Rosser Terrace is expected to experience acceptable overall LOS A under

Build Improved conditions. All approaches and turning movements are expected to maintain acceptable LOS.

The capacity results for evening peak hour are summarized in **Table 8**.

Table 8 2022 Evening Peak Hour Capacity Analysis Comparison No Build vs Improved Conditions

2023 CONDITIONS - (PM)			No Build		Build Improved	
Intersection	Approach	Movement	DELAY (S)	LOS	DELAY (S)	LOS
1 Hugh Howell Rd & Rosser Terrace/Fuller Way	EB	L	8.3	A	8.2	A
		T	0.0	A	0.0	A
		TR	0.0	A	0.0	A
		Approach	0.2	A	0.2	A
	WB	L	9.1	A	9.6	A
		T	0.0	A	0.0	A
		R	0.0	A	0.0	A
		Approach	0.0	A	0.7	A
	NB	Approach	15.2	C	16.7	C
	SB	Approach	10.2	B	10.1	B
	Intersection	-	0.5	A	0.8	A
2 Hugh Howell Rd & Cowan Rd/The Centre Driveway	EB	L	9.3	A	13.2	B
		T	16.7	B	23.6	C
		TR	16.7	B	23.5	C
		Approach	15.9	B	22.5	C
	WB	L	12.1	B	17.4	B
		T	0.4	A	0.5	A
		R	0.2	A	0.2	A
		Approach	1.1	A	1.6	A
	NB	Approach	74.2	E	74.1	E
	SB	L	57.6	E	49.2	D
		TR	56.1	E	47.4	D
		Approach	56.7	E	48.1	D
	Intersection	-	17.6	B	22.9	C

Extracted from Synchro HCM 6th Edition

Based on the results of the capacity analysis, during the evening peak hour, the intersection of Hugh Howell Rd and Rosser Terrace is expected to experience acceptable overall LOS A under Build Improved conditions. All approaches and turning movements are expected to maintain acceptable LOS.

During the evening peak hour, the intersection of Hugh Howell Rd and Cowan Rd/The Centre Driveway is expected to experience acceptable overall LOS C under Build Improved conditions. The northbound approach is anticipated to operate at LOS E under both No Build and Build Improved Conditions with no increase in delay. All approaches and turning movements are expected to maintain acceptable LOS.

Queueing Analysis

The queue length of the turn lanes was analyzed to observe if it exceeded the storage length of the turn lanes. The queue length was extracted from the Synchro 10 HCM 6th Edition Reports

using the 95th Percentile Queue. The queue lengths are presented in **Appendix F. Table 9** summarizes the queue results.

Table 9 Queueing Analysis Comparison

2023 PM PEAK HOUR CONDITIONS				Available Storage (ft)	NO BUILD AM	NO BUILD PM	BUILD AM	BUILD PM	BUILD IMP AM	BUILD IMP PM
Intersection	Approach	Movement			Queue (ft)	Queue (ft)	Queue (ft)	Queue (ft)	Queue (ft)	Queue (ft)
1	Hugh Howell Rd & Rosser Terrace (Unsignalized)	EB	L	100	3	3	3	3	3	3
		WB	L	100	0	0	5	8	5	8
2	Hugh Howell Rd & Cowan Rd/The Centre Driveway (Signalized)	EB	L	125	25	83	38	89		101
		WB	L	115	12	m26	17	m28		m33
		SB	L	100	48	128	42	125		117
3	Hugh Howell Rd & Tucker Industrial Rd (Signalized)	EB	L	150	20	m11	m28	m15		
		WB	L	100	79	#124	79	#124		
4	Cowan Rd & Dillard St (Unsignalized)	NB	Approach	-	3	3	20	23		

Extracted from Synchro10 HCM 6th Edition

Intersections 3 & 4 have Non-NEMA Phasing therefore were extracted from Synchro10 HCM 2000 Edition

95th percentile volume exceeds capacity, queue may be longer.

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

For queue given in term of vehicles one vehicle was assumed equal to 25 ft (Including space in between vehicles).

Based on the 95th% queue results, for the morning peak hour, no storage lengths are exceeded with the inclusion of the proposed development.

Based on the 95th% queue results, for the evening peak hour the storage length of the southbound left-turn lane of the intersection of Hugh Howell Rd & Cowan Rd/The Centre Driveway is expected to be exceeded under No Build, Build and Build Improved Conditions, with no increase in queue length. During the evening peak hour, the westbound left-turn lane of the intersection of Hugh Howell Rd & Tucker Industrial Rd is expected to be exceeded under both No Build and Build Conditions, with no increase in queue length under Build Conditions.

10. Conclusions and Recommendations

Based on the results of the trip generation assessment prepared by Bowman Consulting, the proposed development is expected to generate a total of 261 trips during the morning peak hour and 285 trips during the evening peak hour. It is anticipated that during the morning peak hour 128 of these are existing trips, the remaining 133 are expected to be primary trips. During the evening peak hour, it is anticipated that 143 are existing trips and 142 are new trips.

The study found that based on the City of Tucker Code of Ordinances, a right turn lane is warranted at the eastbound approach of the intersection of Hugh Howell Rd and Rosser Terrace.

The results of the No Build Vs Build conditions capacity analysis comparison indicate the following:

- During the morning peak hour:
All intersections are projected to operate at an acceptable overall LOS B or better during the No Build and Build Conditions. No changes in LOS and minimal increases in delays are expected on all approaches of the analysis intersection.
- During the evening peak hour:

All intersections are projected to operate at an acceptable overall LOS C or better during the No Build and Build Conditions.

The northbound approach of the intersection of Hugh Howell Rd with Cowan Rd is expected to degrade from LOS E under No Build Conditions to LOS F under Build Conditions, with an increase in delay of 10.6 seconds.

The following improvements are proposed:

- Optimize signal timings at Intersection of Hugh Howell Rd & Cowan Rd during evening Peak Hour.
- Provide an eastbound right-turning lane at the intersection of Hugh Howell Rd & Rosser Terrace.

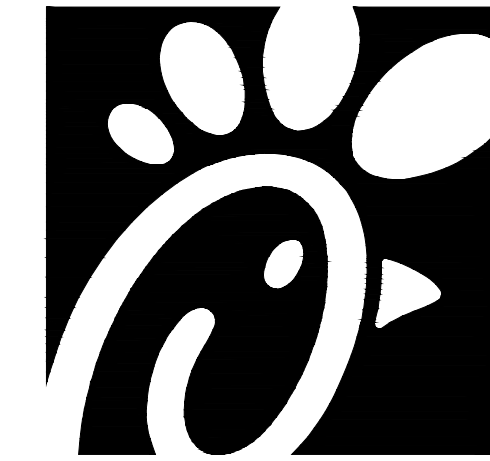
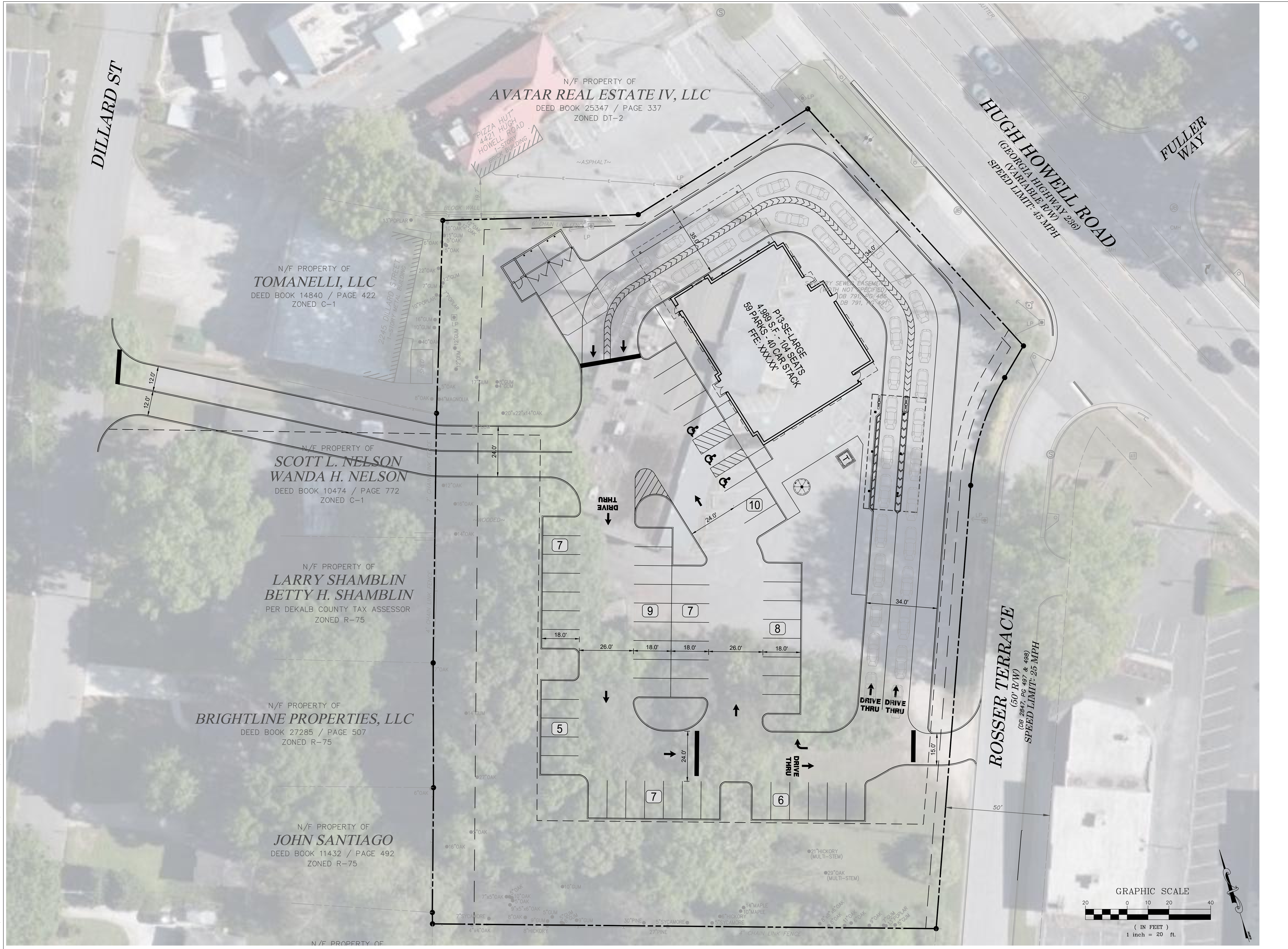
The results of the No Build Vs Build Improved conditions capacity analysis indicate the following:

- During the morning peak hour:
The intersection of Hugh Howell Rd and Rosser Terrace is expected to experience acceptable overall LOS A under Build Improved conditions. All approaches and turning movements are expected to maintain acceptable LOS.
- During the evening peak hour:
The intersection of Hugh Howell Rd and Rosser Terrace is expected to experience acceptable overall LOS A under Build Improved conditions. All approaches and turning movements are expected to maintain acceptable LOS.

The intersection of Hugh Howell Rd and Cowan Rd/The Centre Driveway is expected to experience acceptable overall LOS C under Build Improved conditions. The northbound approach is anticipated to operate at LOS E under both No Build and Build Improved Conditions with no increase in delay. All other approaches and movements in this intersection are anticipated to operate at acceptable LOS D or better under Build Improved Conditions.

Based on the results of the capacity, turn lane and queueing analysis, the proposed Chick-Fil-A at 4431 Hugh Howell Rd, Tucker, GA is not expected to adversely impact the surrounding roadway network provided the proposed improvements mentioned on this report.

APPENDIX A



Chick-fil-A

Chick-fil-A
5200 BUFFINGTON RD
Atlanta, Georgia 30349-2998

Bowman

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© Bowman Consulting Group, Ltd.

CHICK-FIL-A
RELO TUCKER FSU
4435 HUGH HOWELL ROAD
TUCKER, GA 30084

FSU#04959

BUILDING TYPE / SIZE: P13-SE-LRG

REVISION SCHEDULE
NO. DATE DESCRIPTION

CONSULTANT PROJECT # 120005-01-049
ISSUED FOR PERMIT
DATE February 14, 2022
DRAWN BY BCG

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SHEET DILLARD ST
ACCESS EXHIBIT

SHEET NUMBER
EX-1.1

APPENDIX B

**TRAFFIC IMPACT STUDY CHICK-FIL-A, TUCKER, GA
SCOPING/METHODOLOGY STATEMENT**

Scoping Meeting Date: Electronic Coordination

Applicant's Consultant: Bowman Consulting Group

Applicant's Contact information: Andrew J Petersen (321 -270 - 8987 / apetersen@bowman.com)

Daniela Jurado (321 -270 - 8977 / djurado@bowman.com)

(1) LOCATION OF PROPOSED PROJECT: **4431 Hugh Howell Rd, Tucker, GA 30084, See Figure 1.**

Municipality: City of Tucker, GA

County DeKalb County

(2) DESCRIPTION OF PROPOSED PROJECT:

The proposed development comprises a 4,989 square feet Fast-food restaurant with drive-thru window with 44 car stack, located at 4431 Hugh Howell Rd in the city of Tucker, Georgia. Access to the development will be provided by one (1) full-access driveway along Rosser Terrace.

Trip generation rates were extracted from the Institute of Transportation Engineers 10th Edition. The trip generation is presented in **Table 1**. The proposed Trip Distribution is presented in **Figure 2**.

(3) PURPOSE OF THE ASSESSMENT:

The purpose for the study is threefold: to determine the number of trips generated by the proposed site; to determine the potential impact, if any, of the proposed development on the roadway network; to propose improvements, if required.

Capacity analyses will be prepared for the No Build, Build conditions, and Build Conditions with Improvements (if required). Turn lane warrant analyses will be completed at the intersection of Hugh Howell Rd and Rosser Terrace. The results of the study will be summarized in a report document with graphics and back up data.

(4) DEVELOPMENT SCHEDULE:

Anticipated Opening Date: 2022

Analysis Date: 2022

(5) STUDY INTERSECTIONS (See Figure 2):

- Hugh Howell Rd and Rosser Terrace (Unsignalized Intersection)
- Hugh Howell Rd and Tucker Industrial Rd (Signalized Intersection)
- Hugh Howell Rd and Cowan Rd (Signalized Intersection)

(6) STUDY AREA TYPE: Urban: x Rural:

(7) ANALYSIS PERIODS AND TIMES:

AM Peak hour 7:00 AM - 09:00 AM
PM Peak hour 4:00 PM - 06:00 PM

(8) TRAFFIC ADJUSTMENT FACTORS:

(a) Seasonal Adjustment:	<u>To be determined upon coordination</u>	
(b) Annual Base Traffic Growth:	<u>See Table 2</u>	Source: Approximate Growth average from AADT's GDOT Traffic Count Data online

(9) OTHER PROJECTS WITHIN STUDY AREA TO BE ADDED TO BASE TRAFFIC:

To be determined upon coordination

(10) APPROVAL OF DATA COLLECTION ELEMENTS AND METHODOLOGIES:

<u>Proposed Location</u>	<u>Period (Avg Day)</u>	<u>Type</u>
-Hugh Howell Rd and Rosser Terrace	AM/PM	Turning Movement Counts
-Hugh Howell Rd and Tucker Industrial Rd	AM/PM	Turning Movement Counts
-Hugh Howell Rd and Cowan Rd	AM/PM	Turning Movement Counts

(11) CAPACITY/LOS ANALYSIS

<u>Location</u>	<u>Period (Avg Day)</u>	<u>Type</u>
-Hugh Howell Rd and Rosser Terrace	AM/PM	Synchro (HCS)
-Hugh Howell Rd and Tucker Industrial Rd	AM/PM	Synchro (HCS)
-Hugh Howell Rd and Cowan Rd	AM/PM	Synchro (HCS)

(12) ROADWAY IMPROVEMENTS/MODIFICATIONS BY OTHERS TO BE INCLUDED:

To be determine upon coordination

(13) OTHER NEEDED ANALYSES:

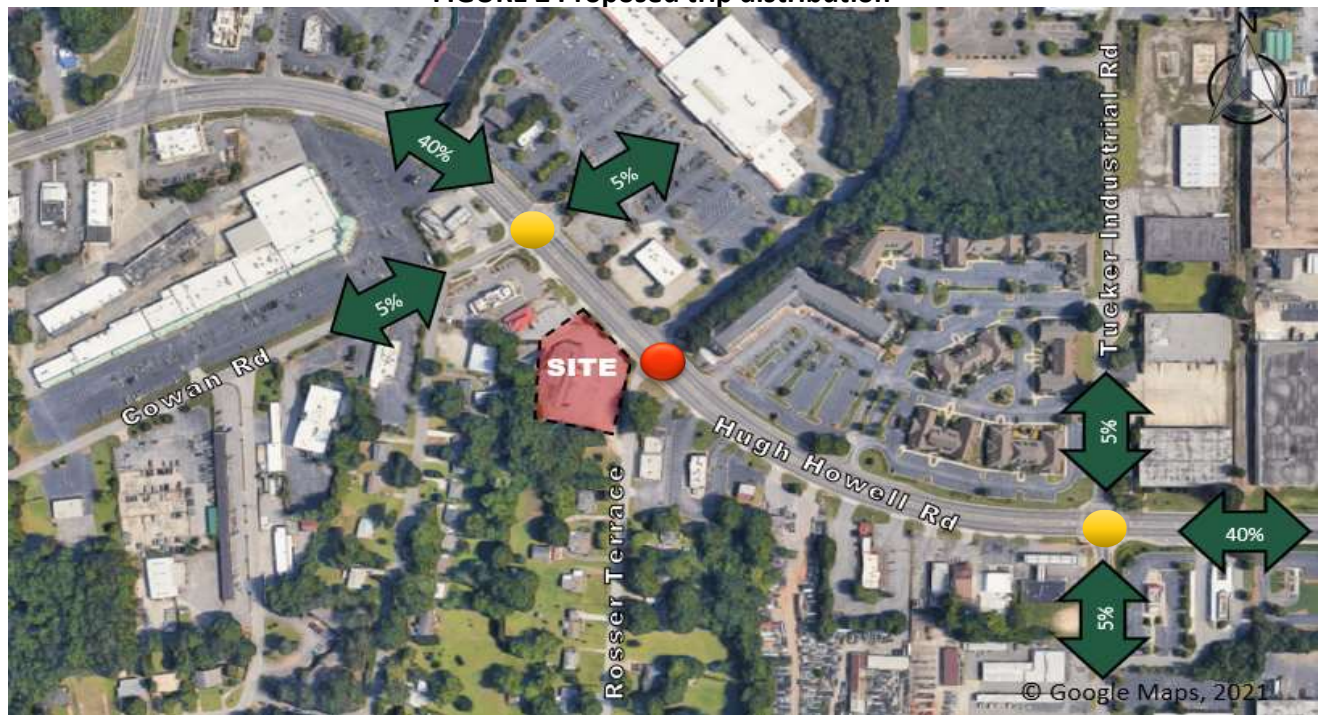
- (a) Signal Warrant Analysis:
No
- (b) Required Signal Phasing/Timing Modifications:
TBD
- (c) Analysis of the Need for Turning Lanes:
-Hugh Howell Rd and Rosser Terrace (Unsignalized Intersection)
- (d) Turning Lane Lengths:
95th Percentile Synchro Queue

(14) ADDITIONAL COMMENTS OR RECOMMENDATIONS RELATIVE TO THE SCOPE OF THIS PROJECT:

TRAFFIC IMPACT STUDY
SCOPING/METHODOLOGY STATEMENT



FIGURE 2 Proposed trip distribution



TRAFFIC IMPACT STUDY SCOPING/METHODOLOGY STATEMENT

TABLE 1

Land Use	Land Use Code ⁽¹⁾	Size	Daily Trips	Period	Peak Hour Trips			Pass by ⁽²⁾			Primary		
					In	Out	Total	In	Out	Total	In	Out	Total
Fast Food restaurant with Drive thru	934	4,989 SF	2,350	AM	102	99	201	50	49	99	52	50	102
				PM	85	78	163	43	39	82	42	39	81

(1) Based on the Institute of Transportation Engineers Trip Generation, 10th Edition

(1) Pass-By rates of 49% for the AM Peak Hour and 50% for the PM Peak Hour were extracted from the ITE Trip Generation Handbook, 3rd Edition

TABLE 2

Roadway	From	to	2015	2016	2017	2018	2019	2016	2017	2018	2019	Avg Growth rate	Applied Growth rate
Hugh Howell Rd	Lawrenceville Hwy	Mountain Industrial Blvd	21,700	22,400	25,600	25,600	24,400	3.2%	14.3%	0.0%	-4.7%	3.2%	3.2%
Rosser Terrace	N/A	N/A	-	-	-	-	-	-	-	-	-	No Data	0.5%
Tucker Industrial Rd	N/A	N/A	-	-	-	-	-	-	-	-	-	No Data	0.5%
Cowan Rd	N/A	N/A	-	-	-	-	-	-	-	-	-	No Data	0.5%

Source: Approximate Growth average from 2015-2019 AADT's GDOT Traffic Count Database System (TCDS).

<https://gdottrafficdata.drakewell.com/publicmultinodemap.asp>

A 0.5% minimum growth rate for the roads was assumed based on the City of Tucker population growth rate.

Rodrigo Meirelles

From: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>
Sent: Wednesday, June 9, 2021 5:23 PM
To: Daniela Jurado
Cc: Andrew Petersen; Rodrigo Meirelles
Subject: [EXTERNAL] RE: [External]RE: [External]RE: Chick-fil-A Tucker Methodology Coordination

Yes, these will be a good representation.



**City of
Tucker**

KEN HILDEBRANDT, PE, PTOE
CITY ENGINEER

M: 770-865-5645

E: khildebrandt@tuckerga.gov W: tuckerga.gov



From: Daniela Jurado <djurado@bowman.com>
Sent: Wednesday, June 9, 2021 4:15 PM
To: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>
Cc: Andrew Petersen <apetersen@bowman.com>; Rodrigo Meirelles <rmeirelles@bowman.com>
Subject: [External]RE: [External]RE: Chick-fil-A Tucker Methodology Coordination

Good Afternoon Ken,

We received some trip generation information today of some CFA locations in the Great Atlanta area, average weekday (M-Th) information from 2 months in 2019 and February 2021 when school was in session. The locations are the following:

- 1- 2580 Piedmont Rd
- 2- 2340 N Druid Hills Rd
- 3- 1100 Northside Dr

Sincerely,

DANIELA JURADO

Project Manager | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762

djurado@bowman.com | bowman.com



From: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>
Sent: Wednesday, June 9, 2021 8:23 AM
To: Daniela Jurado <djurado@bowman.com>

Cc: Andrew Petersen <apetersen@bowman.com>; Rodrigo Meirelles <rmeirelles@bowman.com>

Subject: [EXTERNAL] RE: [External]RE: Chick-fil-A Tucker Methodology Coordination

What is the ADT on the street in Miami?

Is it a comparable site?



KEN HILDEBRANDT, PE, PTOE

CITY ENGINEER

M: 770-865-5645

E: khildebrandt@tuckerga.gov W: tuckerga.gov



From: Daniela Jurado <djurado@bowman.com>

Sent: Tuesday, June 8, 2021 2:21 PM

To: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>

Cc: Andrew Petersen <apetersen@bowman.com>; Rodrigo Meirelles <rmeirelles@bowman.com>

Subject: [External]RE: Chick-fil-A Tucker Methodology Coordination

Good Afternoon Ken,

For the trip generation of the CFA we have conducted a trip generation study for a CFA in the Miami Dade area. Is it possible for us to use this trip generation study results to evaluate the trip generation for this site?

Thank you,

DANIELA JURADO

Project Manager | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762

djurado@bowman.com | bowman.com



From: Daniela Jurado

Sent: Tuesday, June 8, 2021 8:47 AM

To: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>

Subject: RE: Chick-fil-A Tucker Methodology Coordination

Thank you,

DANIELA JURADO

Project Manager | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762

djurado@bowman.com | bowman.com



From: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>
Sent: Tuesday, June 8, 2021 8:36 AM
To: Daniela Jurado <djurado@bowman.com>
Subject: [EXTERNAL] Chick-fil-A Tucker Methodology Coordination

DeKalb County maintains our traffic signals. You may be able to get this information from Demetria Allen.
dfchambliss@dekalbcountyga.gov



KEN HILDEBRANDT, PE, PTOE
CITY ENGINEER

M: 770-865-5645

E: khildebrandt@tuckerga.gov W: tuckerga.gov



From: Daniela Jurado <djurado@bowman.com>
Sent: Tuesday, June 8, 2021 8:28 AM
To: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>; Rodrigo Meirelles <rmeirelles@bowman.com>; Courtney Smith <CSmith@Tuckerga.gov>; Kylie Thomas <kthomas@tuckerga.gov>
Cc: Andrew Petersen <apetersen@bowman.com>
Subject: [External]RE: [External]RE: [External]RE: Chick-fil-A Tucker Methodology Coordination

Good Morning Ken,

Is there a way we can get the signal phasing and timings for the intersections of Hugh Howell Rd and Tucker Industrial Rd and Hugh Howell Rd and Cowan Rd?

Thank you,

DANIELA JURADO

Project Manager | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762

djurado@bowman.com | bowman.com



From: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>
Sent: Monday, June 7, 2021 3:21 PM
To: Daniela Jurado <djurado@bowman.com>; Rodrigo Meirelles <rmeirelles@bowman.com>; Courtney Smith <CSmith@Tuckerga.gov>; Kylie Thomas <kthomas@tuckerga.gov>
Cc: Andrew Petersen <apetersen@bowman.com>
Subject: [EXTERNAL] RE: [External]RE: [External]RE: Chick-fil-A Tucker Methodology Coordination

No further comments at this time.



KEN HILDEBRANDT, PE, PTOE
CITY ENGINEER

M: 770-865-5645

E: khildebrandt@tuckerga.gov W: tuckerga.gov



From: Daniela Jurado <djurado@bowman.com>

Sent: Monday, June 7, 2021 3:18 PM

To: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>; Rodrigo Meirelles <rmeirelles@bowman.com>; Courtney Smith <CSmith@Tuckerga.gov>; Kylie Thomas <kthomas@tuckerga.gov>

Cc: Andrew Petersen <apetersen@bowman.com>

Subject: [External]RE: [External]RE: Chick-fil-A Tucker Methodology Coordination

Thank you Ken,

We will start working on the best locations to get this data collected. Besides the trip generation, is there any other comments on the proposed methodology?

Sincerely,

DANIELA JURADO

Project Manager | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762

djurado@bowman.com | bowman.com



From: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>

Sent: Monday, June 7, 2021 12:46 PM

To: Daniela Jurado <djurado@bowman.com>; Rodrigo Meirelles <rmeirelles@bowman.com>; Courtney Smith <CSmith@Tuckerga.gov>; Kylie Thomas <kthomas@tuckerga.gov>

Cc: Andrew Petersen <apetersen@bowman.com>

Subject: [EXTERNAL] RE: [External]RE: Chick-fil-A Tucker Methodology Coordination

Again, I think that a Chick fil-A is a different animal and is not accurately represented in this trip generation category.



KEN HILDEBRANDT, PE, PTOE
CITY ENGINEER

M: 770-865-5645

E: khildebrandt@tuckerga.gov W: tuckerga.gov



From: Daniela Jurado <djurado@bowman.com>

Sent: Monday, June 7, 2021 9:53 AM

To: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>; Rodrigo Meirelles <rmeirelles@bowman.com>; Courtney Smith <CSmith@Tuckerga.gov>; Kylie Thomas <kthomas@tuckerga.gov>

Cc: Andrew Petersen <apetersen@bowman.com>

Subject: [External]RE: Chick-fil-A Tucker Methodology Coordination

Good Morning Ken,

Would it be possible for us to use the ITE mean values plus one standard deviation. That would leave the following trip generation:

Mean

Land Use	Land Use Code ⁽¹⁾	Size	Daily Trips	Period	Peak Hour Trips			Pass. by ⁽²⁾		
					In	Out	Total	In	Out	Total
Fast Food restaurant with Drive thru	934	4,989	1,893	AM	103	98	201	50	48	99
				PM	85	78	163	42	38	80

(1) Based on the Institute of Transportation Engineers Trip Generation, 10th Edition

(1) Pass-By rates of 49% were extracted from the Institute of Transportation Engineers Trip Generation Handbook, 3rd Edition

Mean +1 std dev

Land Use	Land Use Code ⁽¹⁾	Size	Daily Trips	Period	Peak Hour Trips			Pass. by ⁽²⁾		
					In	Out	Total	In	Out	Total
Fast Food restaurant with Drive thru	934	4,989	1,893	AM	175	169	344	86	83	169
				PM	131	121	252	64	59	123

(1) Based on the Institute of Transportation Engineers Trip Generation, 10th Edition

(1) Pass-By rates of 49% were extracted from the Institute of Transportation Engineers Trip Generation Handbook, 3rd Edition

Would you agree with this approach?

Thank you,

DANIELA JURADO

Project Manager | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762

djurado@bowman.com | bowman.com



From: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>

Sent: Monday, June 7, 2021 8:18 AM

To: Rodrigo Meirelles <rmeirelles@bowman.com>; Courtney Smith <CSmith@Tuckerga.gov>; Kylie Thomas <kthomas@tuckerga.gov>

Cc: Daniela Jurado <djurado@bowman.com>; Andrew Petersen <apetersen@bowman.com>

Subject: [EXTERNAL] Chick-fil-A Tucker Methodology Coordination

Rodrigo,

A Chick fil-A restaurant is rather unique and does not fit in the mold of Code 934 for a Fast Food Restaurant. Actual trip generation will be significantly higher. A more accurate estimate would be to provide counts at an existing comparably sized Chick fil-A.

You can call me at the number below with any questions.



KEN HILDEBRANDT, PE, PTOE
CITY ENGINEER

M: 770-865-5645

E: khildebrandt@tuckerga.gov W: tuckerga.gov



From: Rodrigo Meirelles <rmeirelles@bowman.com>

Sent: Thursday, June 3, 2021 10:18 AM

To: Ken Hildebrandt <KHildebrandt@Tuckerga.gov>; Courtney Smith <CSmith@Tuckerga.gov>; Kylie Thomas <kthomas@tuckerga.gov>

Cc: Daniela Jurado <djurado@bowman.com>; Andrew Petersen <apetersen@bowman.com>

Subject: [External]Chick-fil-A Tucker Methodology Coordination

Good Morning Ken, Courtney, and Kylie,

I am contacting you regarding a Chick-fil-A project at 4431 Hugh Howell Rd, Tucker, GA. The site will be replacing the existing Presbyterian Church. Attached you will find a Methodology Statement with the Trip Generation for this site and a Current Site Plan.

We want to schedule a meeting with the City of Tucker to verify that our methodology for this Traffic Impact Study is acceptable. Could you reply to this email with the best time for you to discuss this project?

Thank you in advance.

Sincerely,

RODRIGO MEIRELLES VAN VLIET

Engineer I | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905

rmeirelles@bowman.com | bowman.com



Rodrigo Meirelles

From: Rodrigo Meirelles
Sent: Wednesday, June 9, 2021 10:48 AM
To: Mathis, Renaldo M
Cc: Daniela Jurado; Andrew Petersen
Subject: RE: Chick-fil-A Tucker Methodology Coordination - GDOT

That will work, thank you very much Renaldo. Can you please include Daniela Jurado (djurado@bowman.com) and Andrew Petersen (apetersen@bowman.com) to the meeting invite as well?

Sincerely,

RODRIGO MEIRELLES VAN VLIET

Engineer I | **BOWMAN**

O: (321) 270-8905

rmeirelles@bowman.com

From: Mathis, Renaldo M <RMathis@dot.ga.gov>
Sent: Wednesday, June 9, 2021 10:35 AM
To: Rodrigo Meirelles <rmeirelles@bowman.com>
Subject: [EXTERNAL] RE: Chick-fil-A Tucker Methodology Coordination - GDOT

I will set the meeting on Microsoft teams for Tuesday at 1.

Thanks,

Renaldo M. Mathis

Civil Engineer II

Serving City of Atlanta & DeKalb County



District 7 Office of *Traffic Operations*
5025 New Peachtree Road
Chamblee, GA, 30341
770.216.3993 office
404.655.8946 mobile

From: Rodrigo Meirelles <rmeirelles@bowman.com>
Sent: Wednesday, June 9, 2021 10:20 AM
To: Mathis, Renaldo M <RMathis@dot.ga.gov>
Cc: Daniela Jurado <djurado@bowman.com>; Andrew Petersen <apetersen@bowman.com>
Subject: RE: Chick-fil-A Tucker Methodology Coordination - GDOT

Hello Renaldo,

Sorry for misspelling your name at first. Either one of these days will work for us. Let us know what time works best for you and your manager.

Thank you,

RODRIGO MEIRELLES VAN VLIET

Engineer I | **BOWMAN**

O: (321) 270-8905

rmeirelles@bowman.com

From: Mathis, Renaldo M <RMathis@dot.ga.gov>

Sent: Wednesday, June 9, 2021 9:35 AM

To: Rodrigo Meirelles <rmeirelles@bowman.com>

Subject: [EXTERNAL] RE: Chick-fil-A Tucker Methodology Coordination - GDOT

Good morning Rodrigo,

I can set a meeting for sometime early next week if that works for you. I m going to speak with my manager to see what times work best based on the day you prefer. I'm thinking sometime Monday or Tuesday. How does these dates sound to you?

Thanks,

Renaldo M. Mathis

Civil Engineer II

Serving City of Atlanta & DeKalb County



District 7 Office of *Traffic Operations*

5025 New Peachtree Road

Chamblee, GA, 30341

770.216.3993 office

404.655.8946 mobile

From: Rodrigo Meirelles <rmeirelles@bowman.com>

Sent: Wednesday, June 9, 2021 9:12 AM

To: Mathis, Renaldo M <RMathis@dot.ga.gov>

Cc: Andrew Petersen <apetersen@bowman.com>; Daniela Jurado <djurado@bowman.com>

Subject: RE: Chick-fil-A Tucker Methodology Coordination - GDOT

Good Morning Ronaldo,

I wanted to follow up on my previous email and see if you received my previous email with the attached methodology for this project, and if there is any additional information you require for the TIA of this project.

Please do not hesitate to contact us.

Thank you in advance,

RODRIGO MEIRELLES VAN VLIET

Engineer I | **BOWMAN**

O: (321) 270-8905

rmeirelles@bowman.com

From: Rodrigo Meirelles

Sent: Thursday, June 3, 2021 2:06 PM

To: rmathis@dot.ga.gov

Cc: Andrew Petersen <apetersen@bowman.com>; Daniela Jurado <djurado@bowman.com>

Subject: Chick-fil-A Tucker Methodology Coordination - GDOT

Good Morning Ronaldo,

I am contacting you regarding a Chick-fil-A project at 4431 Hugh Howell Rd, Tucker, GA. The site will be replacing the existing Presbyterian Church. Attached you will find a Methodology Statement with the Trip Generation for this site and the most recent Site Plan.

We want to schedule a meeting with the GDOT to verify that our methodology for this Traffic Impact Study is acceptable. Could you reply to this email with the best time for you to discuss this project?

Thank you in advance.

Sincerely,

RODRIGO MEIRELLES VAN VLIET

Engineer I | **BOWMAN**

4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934

O: (321) 270-8905

rmeirelles@bowman.com | bowman.com

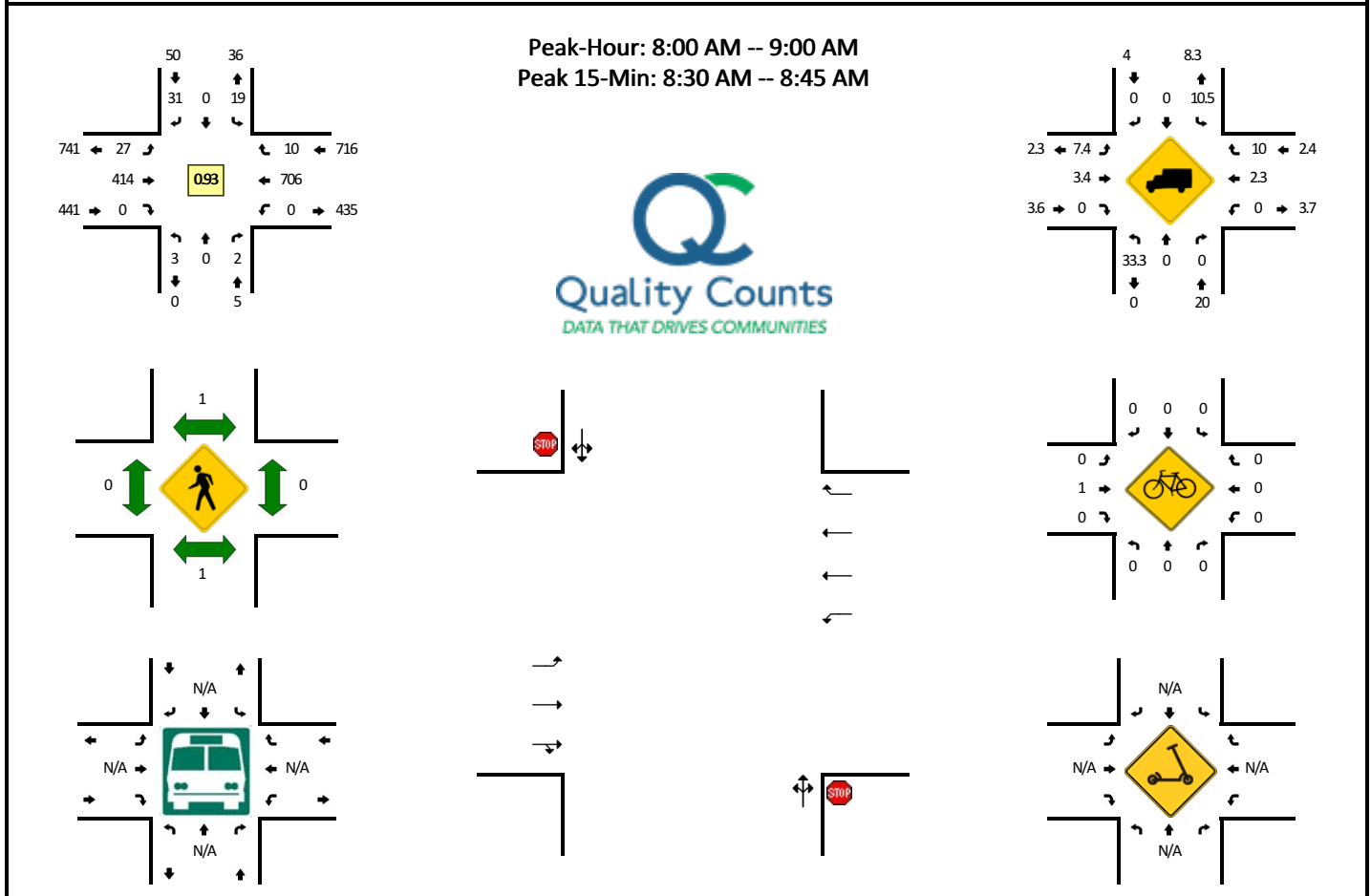


Georgia is a state of natural beauty. And it's a state that spends millions each year cleaning up litter that not only mars that beauty, but also affects road safety, the environment and the economy. Do your part – don't litter. How can you play an active role in protecting the splendor of the Peach State? Find out at <http://keepgaclean.com/>.

APPENDIX C

LOCATION: Rosser Ter -- Hugh Howell Rd
CITY/STATE: Tucker, GA

QC JOB #: 15488401
DATE: Tue, Jun 15 2021

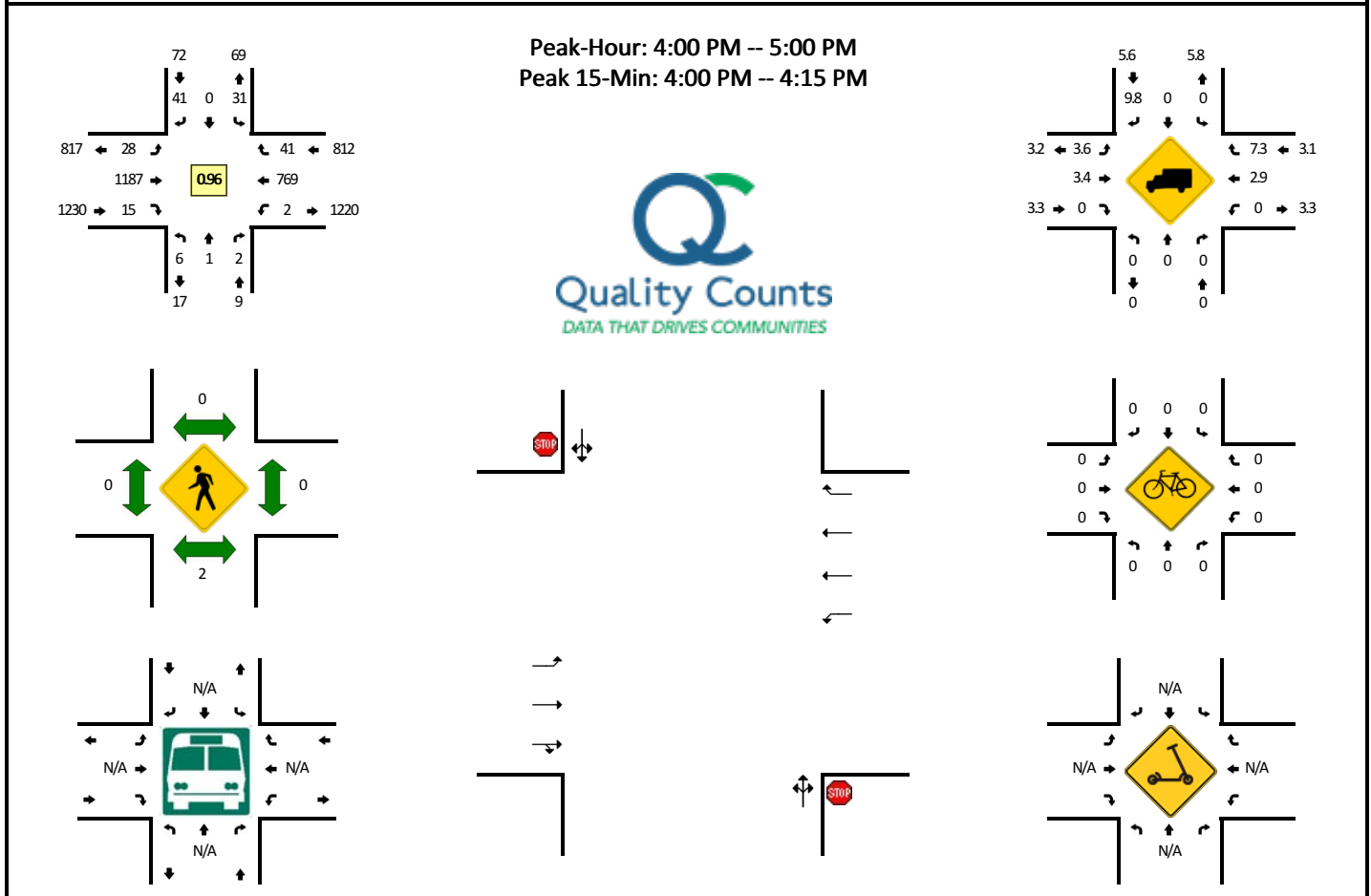


15-Min Count Period Beginning At	Rosser Ter (Northbound)				Rosser Ter (Southbound)				Hugh Howell Rd (Eastbound)				Hugh Howell Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	0	0	0	2	0	7	0	1	59	0	0	0	118	5	0	194	
7:15 AM	2	0	0	0	5	0	5	0	1	87	0	0	0	124	2	0	226	
7:30 AM	2	0	0	0	3	1	4	0	11	60	0	0	1	167	3	0	252	
7:45 AM	4	0	1	0	5	0	12	0	2	98	1	0	0	165	3	0	291	963
8:00 AM	0	0	0	0	3	0	7	0	4	100	0	0	0	170	2	0	286	1055
8:15 AM	1	0	1	0	4	0	8	0	6	103	0	0	0	168	4	0	295	1124
8:30 AM	1	0	0	0	7	0	8	0	5	107	0	0	0	196	2	0	326	1198
8:45 AM	1	0	1	0	5	0	8	0	11	104	0	1	0	172	2	0	305	1212
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	4	0	0	0	28	0	32	0	20	428	0	0	0	784	8	0	1304	
Heavy Trucks	0	0	0	0	0	0	0	0	0	20	0	0	0	4	0	0	24	
Buses																		
Pedestrians		4				0				0				0			4	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scooters																		

Comments:

LOCATION: Rosser Ter -- Hugh Howell Rd
CITY/STATE: Tucker, GA

QC JOB #: 15488402
DATE: Tue, Jun 15 2021

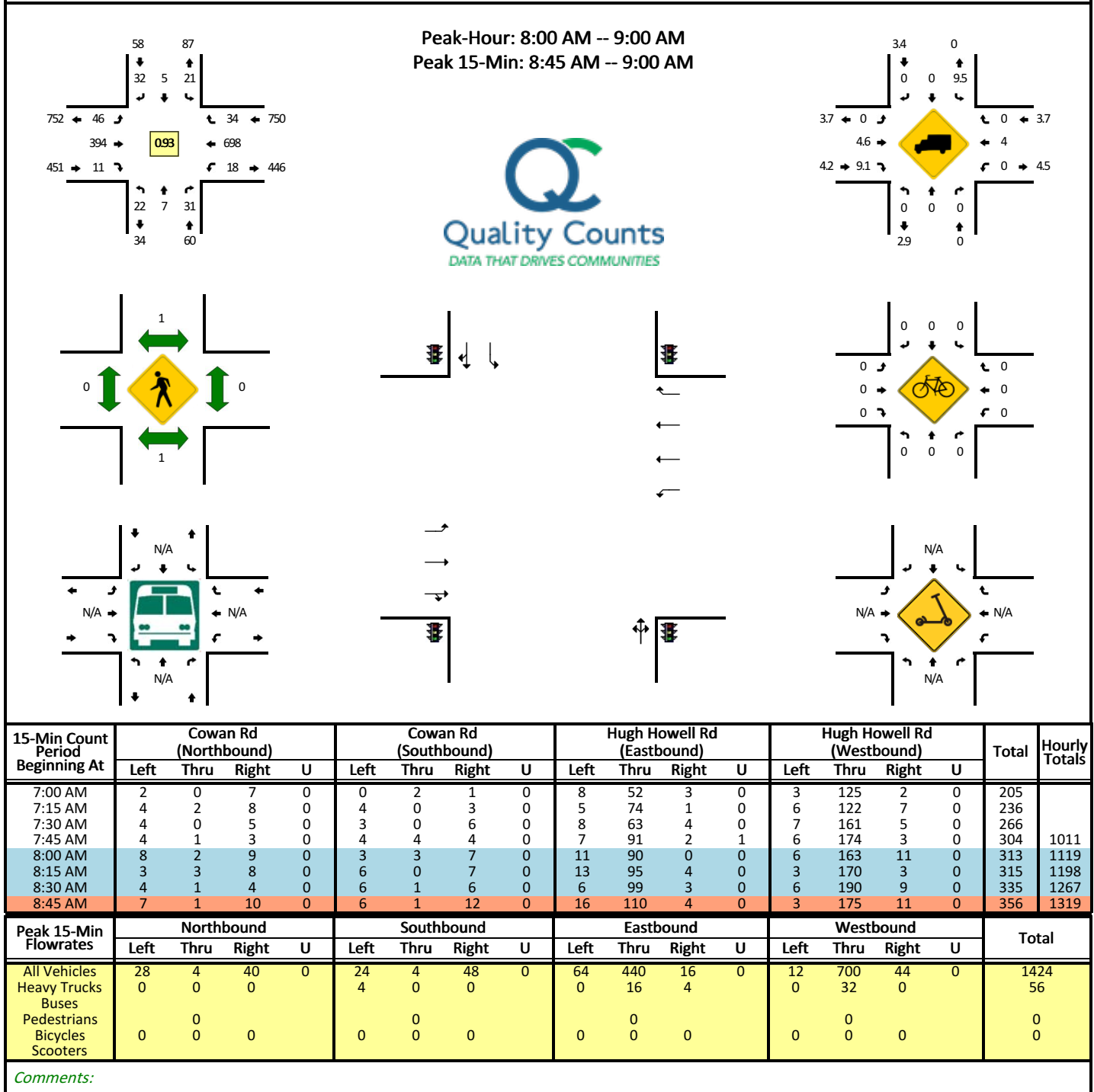


15-Min Count Period Beginning At	Rosser Ter (Northbound)				Rosser Ter (Southbound)				Hugh Howell Rd (Eastbound)				Hugh Howell Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	9	0	11	0	3	315	3	0	0	203	8	0	552	
4:15 PM	2	0	0	0	9	0	6	0	12	294	3	0	1	196	12	0	535	
4:30 PM	3	0	1	0	6	0	11	0	4	329	6	0	0	169	11	0	540	
4:45 PM	1	1	1	0	7	0	13	0	8	249	3	1	1	201	10	0	496	2123
5:00 PM	0	0	1	0	6	0	11	0	2	285	6	0	0	187	9	0	507	2078
5:15 PM	3	0	0	0	9	0	9	0	7	332	2	0	1	193	11	0	567	2110
5:30 PM	2	0	0	0	2	0	11	0	7	302	2	0	0	165	9	0	500	2070
5:45 PM	1	0	1	0	1	1	7	0	9	316	7	0	0	189	5	0	537	2111
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	36	0	44	0	12	1260	12	0	0	812	32	0	2208	
Heavy Trucks	0	0	0	0	0	0	4	0	0	32	0	0	0	32	4	0	72	
Buses																		
Pedestrians		4				0				0				0			4	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

Comments:

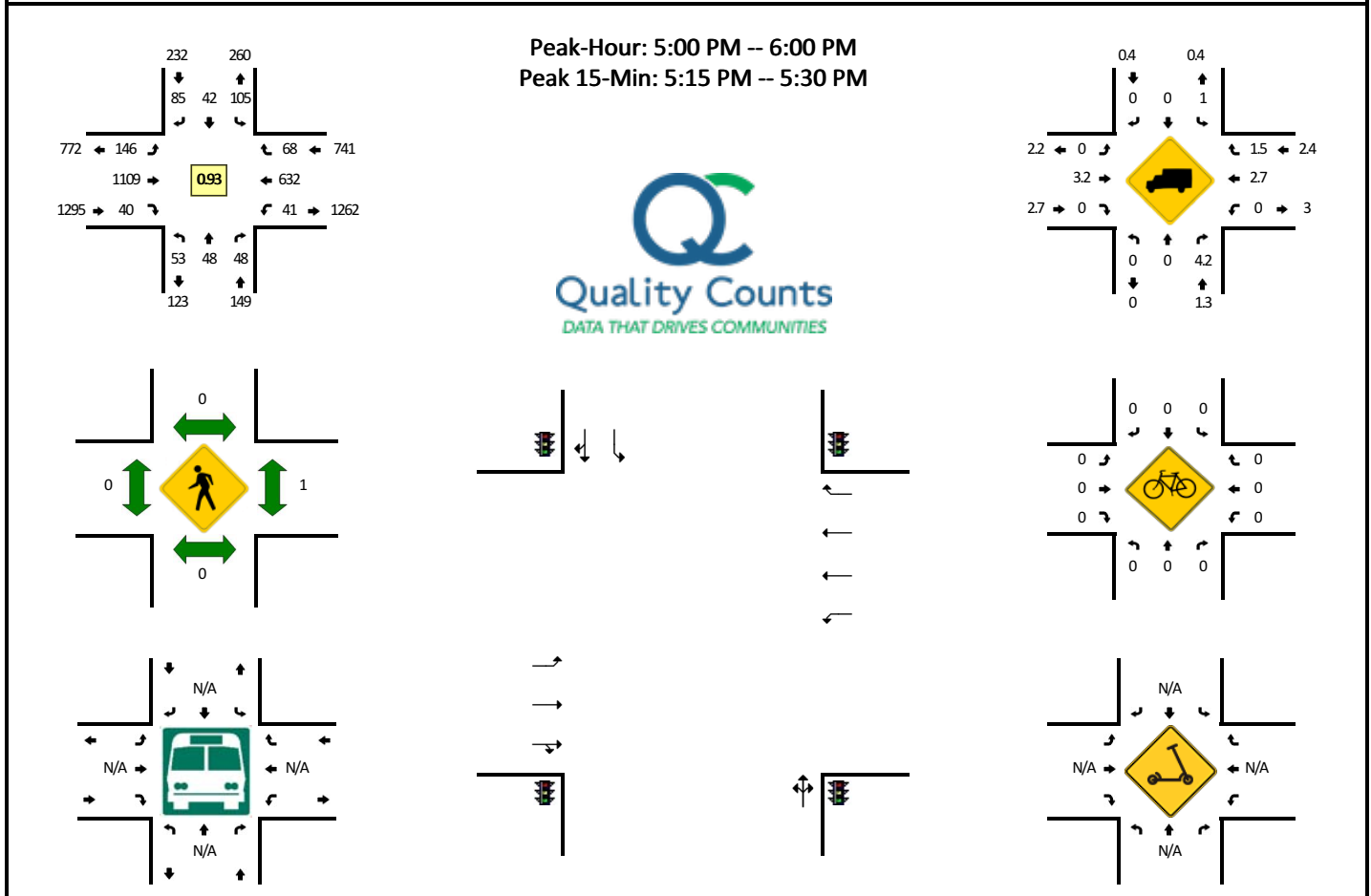
LOCATION: Cowan Rd -- Hugh Howell Rd
CITY/STATE: Tucker, GA

QC JOB #: 15488403
DATE: Tue, Jun 15 2021



LOCATION: Cowan Rd -- Hugh Howell Rd
CITY/STATE: Tucker, GA

QC JOB #: 15488404
DATE: Tue, Jun 15 2021

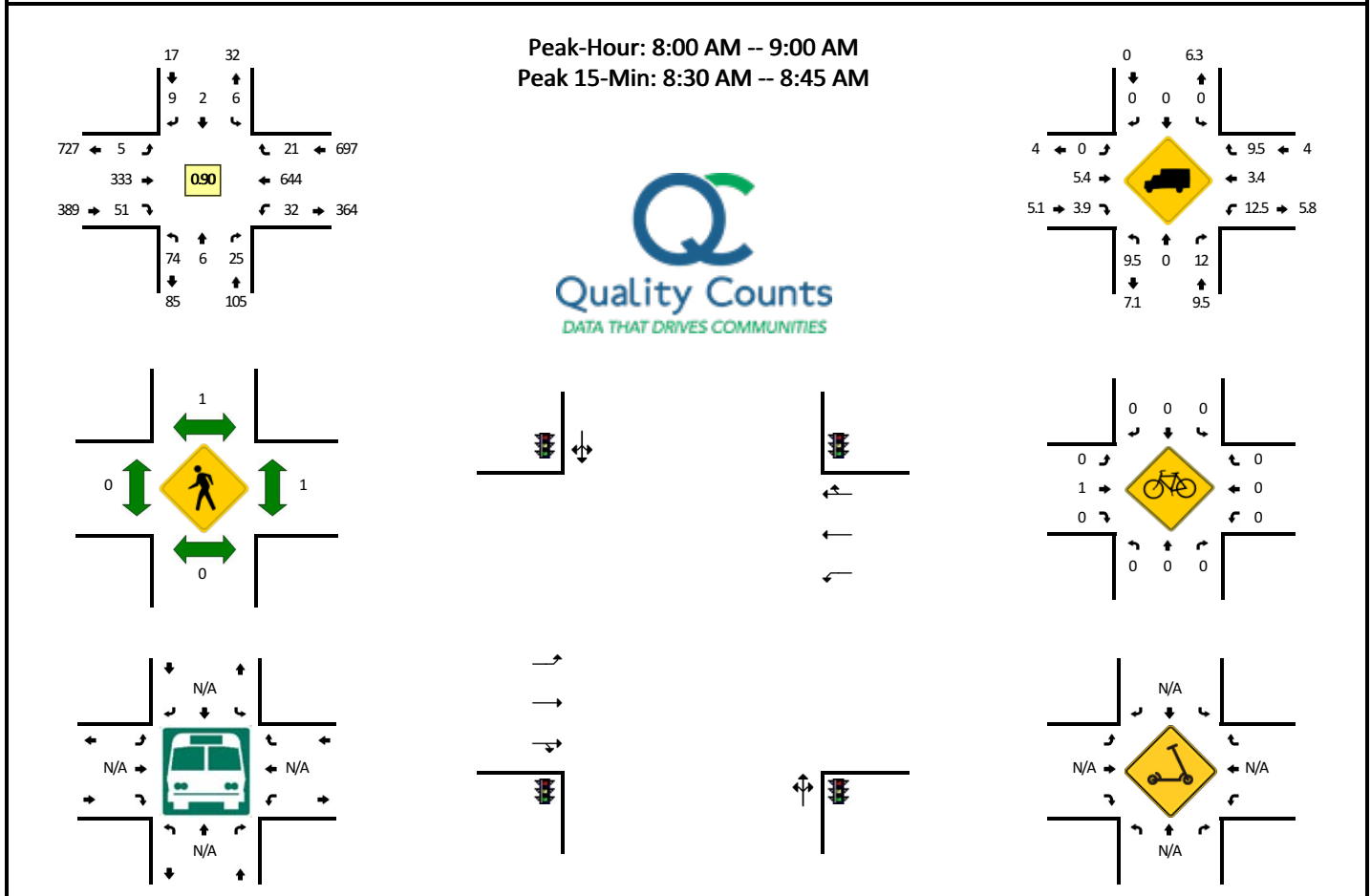


15-Min Count Period Beginning At	Cowan Rd (Northbound)				Cowan Rd (Southbound)				Hugh Howell Rd (Eastbound)				Hugh Howell Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	11	6	13	0	18	7	29	0	37	291	18	0	15	181	17	0	643	
4:15 PM	18	5	19	0	23	14	29	0	37	260	7	0	9	159	22	0	602	
4:30 PM	9	11	11	0	19	5	15	0	35	301	5	0	14	159	13	0	597	
4:45 PM	13	7	11	0	26	9	25	0	29	228	10	0	11	175	24	0	568	2410
5:00 PM	11	13	8	0	24	6	15	0	46	268	16	0	8	153	17	0	585	2352
5:15 PM	15	12	15	0	22	10	24	0	36	296	9	1	10	183	16	0	649	2399
5:30 PM	13	8	17	0	25	14	19	0	37	258	8	1	12	144	17	0	573	2375
5:45 PM	14	15	8	0	34	12	27	0	25	287	7	0	11	152	18	0	610	2417
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	60	48	60	0	88	40	96	0	144	1184	36	4	40	732	64	0	2596	
Heavy Trucks	0	0	4	0	0	0	0	0	0	36	0	0	0	4	0	0	44	
Buses																		
Pedestrians	0	0			0	0			0	0			0	0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

Comments:

LOCATION: Tucker Industrial Rd -- Hugh Howell Rd
CITY/STATE: Tucker, GA

QC JOB #: 15488405
DATE: Tue, Jun 15 2021

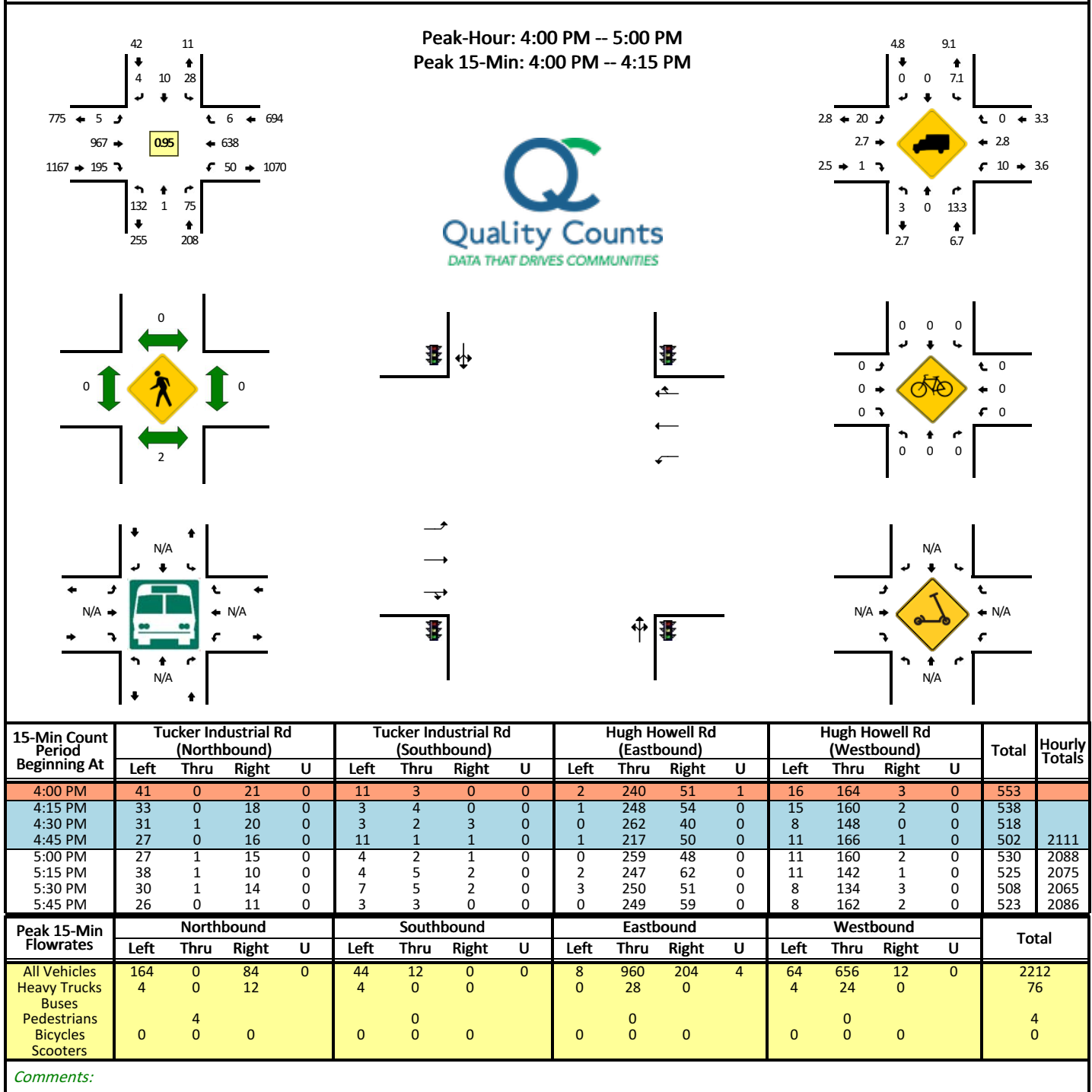


15-Min Count Period Beginning At	Tucker Industrial Rd (Northbound)				Tucker Industrial Rd (Southbound)				Hugh Howell Rd (Eastbound)				Hugh Howell Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	10	1	8	0	0	0	0	0	0	46	17	0	16	115	1	0	214	
7:15 AM	11	1	8	0	0	0	1	0	2	68	11	0	13	124	2	0	241	
7:30 AM	29	0	6	0	1	1	0	0	2	50	11	0	10	133	5	0	248	
7:45 AM	13	3	2	0	0	1	0	0	0	89	10	0	19	162	4	0	303	1006
8:00 AM	19	2	2	0	3	0	0	0	3	80	11	0	10	156	3	0	289	1081
8:15 AM	21	0	4	0	2	0	2	0	1	89	5	0	8	145	4	0	281	1121
8:30 AM	14	3	10	0	0	1	4	0	1	81	19	0	6	184	11	0	334	1207
8:45 AM	20	1	9	0	1	1	3	0	0	83	16	0	8	159	3	0	304	1208
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	56	12	40	0	0	4	16	0	4	324	76	0	24	736	44	0	1336	
Heavy Trucks	4	0	4	0	0	0	0	0	0	32	0	0	4	8	4	0	56	
Buses																		
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Scooters																		

Comments:

LOCATION: Tucker Industrial Rd -- Hugh Howell Rd
CITY/STATE: Tucker, GA

QC JOB #: 15488406
DATE: Tue, Jun 15 2021



Project ID: 22-180036-001
Location: Dillard St & Cowan Rd
City: Tucker

Day: Tuesday
Date: 3/1/2022

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Dillard St Northbound						Dillard St Southbound						Cowan Rd Eastbound						Cowan Rd Westbound							
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total	
7:00 AM	1	0	5	0	1	6	0	0	0	0	0	0	0	13	0	0	0	0	13	2	3	0	0	0	5	24
7:15 AM	0	0	14	0	0	14	0	0	0	0	0	0	0	9	0	0	0	0	9	1	8	0	0	0	9	32
7:30 AM	0	0	7	0	1	7	0	0	0	0	0	0	0	8	0	0	0	0	8	4	7	0	0	0	11	26
7:45 AM	5	0	6	0	0	11	0	0	0	0	0	0	0	27	0	0	0	0	27	4	10	0	0	0	14	52
Total	6	0	32	0	2	38	0	0	0	0	0	0	0	57	0	0	0	0	57	11	28	0	0	0	39	134
8:00 AM	2	0	5	0	0	7	0	0	0	0	0	0	0	13	1	0	0	0	14	3	9	0	0	0	12	33
8:15 AM	2	0	4	0	0	6	0	0	0	0	0	0	0	14	0	0	0	0	14	1	20	0	0	0	21	41
8:30 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	16	1	0	1	17	1	9	0	0	0	10	29	
8:45 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	10	0	0	0	10	2	13	0	0	0	15	29	
Total	4	0	15	0	0	19	0	0	0	0	0	0	0	53	2	0	1	55	7	51	0	0	0	58	132	
BREAK																										
4:00 PM	2	0	7	0	0	9	0	0	0	0	0	0	0	43	2	0	0	45	4	20	0	0	0	24	78	
4:15 PM	0	0	6	0	1	6	0	0	0	0	0	0	0	44	1	0	1	45	3	15	0	0	0	18	69	
4:30 PM	0	0	8	0	2	8	0	0	0	0	0	0	0	38	2	0	1	40	3	28	0	0	0	31	79	
4:45 PM	1	0	10	0	0	11	0	0	0	0	0	0	0	23	1	0	0	24	5	26	0	1	0	32	67	
Total	3	0	31	0	3	34	0	0	0	0	0	0	0	148	6	0	2	154	15	89	0	1	0	105	293	
5:00 PM	0	0	5	0	1	5	0	0	0	0	0	0	0	26	1	0	0	27	7	28	0	0	2	35	67	
5:15 PM	2	0	6	0	0	8	0	0	0	0	0	0	0	36	0	0	0	36	6	30	0	0	0	36	80	
5:30 PM	0	0	12	0	0	12	0	0	0	0	0	0	0	35	2	0	0	37	7	20	0	0	0	27	76	
5:45 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	37	1	0	0	38	7	19	0	0	0	26	70	
Total	2	0	29	0	1	31	0	0	0	0	0	0	0	134	4	0	0	138	27	97	0	0	2	124	293	
Grand Total	15	0	107	0	6	122	0	0	0	0	0	0	0	392	12	0	3	404	60	265	0	1	2	326	852	
Apprch %	12.3	0.0	87.7	0.0	4.9		0.0	0.0	0.0	0.0	0.0		0.0	97.0	3.0	0.0	0.7		18.4	81.3	0.0	0.3	0.6			
Total %	1.8	0.0	12.6	0.0	0.7	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.0	1.4	0.0	0.4	47.4	7.0	31.1	0.0	0.1	0.2	38.3		
Cars, PU, Vans	15	0	105	0		120	0	0	0	0		0	0	382	10	0		392	60	255	0	1		316	828	
% Cars, PU, Vans	100.0	0.0	98.1	0.0		98.4	0.0	0.0	0.0	0.0		0.0	0.0	97.4	83.3	0.0		97.0	100.0	96.2	0.0	100.0		96.9	97.2	
Heavy trucks	0	0	2	0		2	0	0	0	0		0	0	10	2	0		12	0	10	0	0		10	24	
%Heavy trucks	0.0	0.0	1.9	0.0		1.6	0.0	0.0	0.0	0.0		0.0	0.0	2.6	16.7	0.0		3.0	0.0	3.8	0.0	0.0		3.1	2.8	

Project ID: 22-180036-001
Location: Dillard St & Cowan Rd
City: Tucker

PEAK HOURS

Day: Tuesday
Date: 3/1/2022

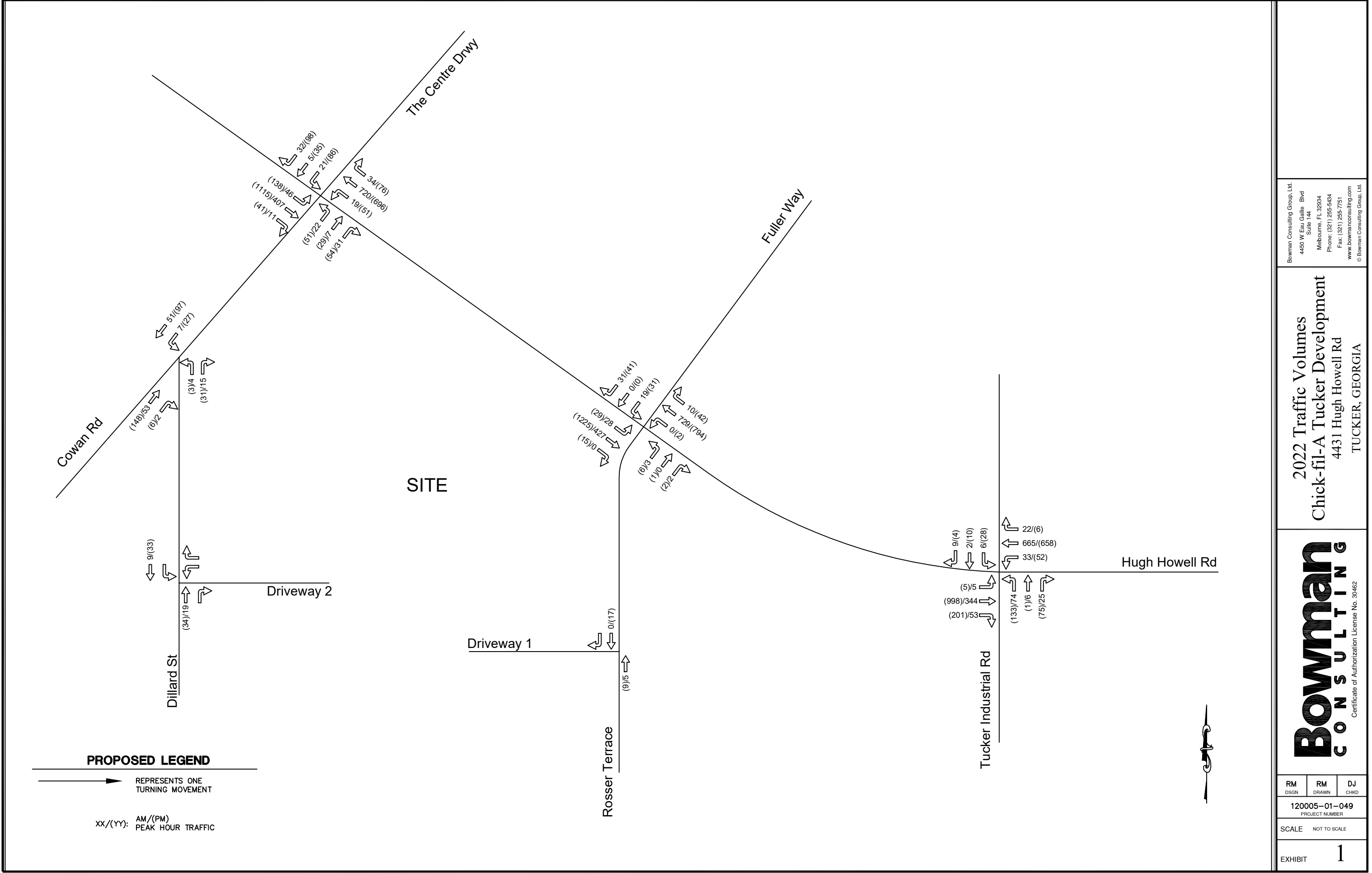
AM

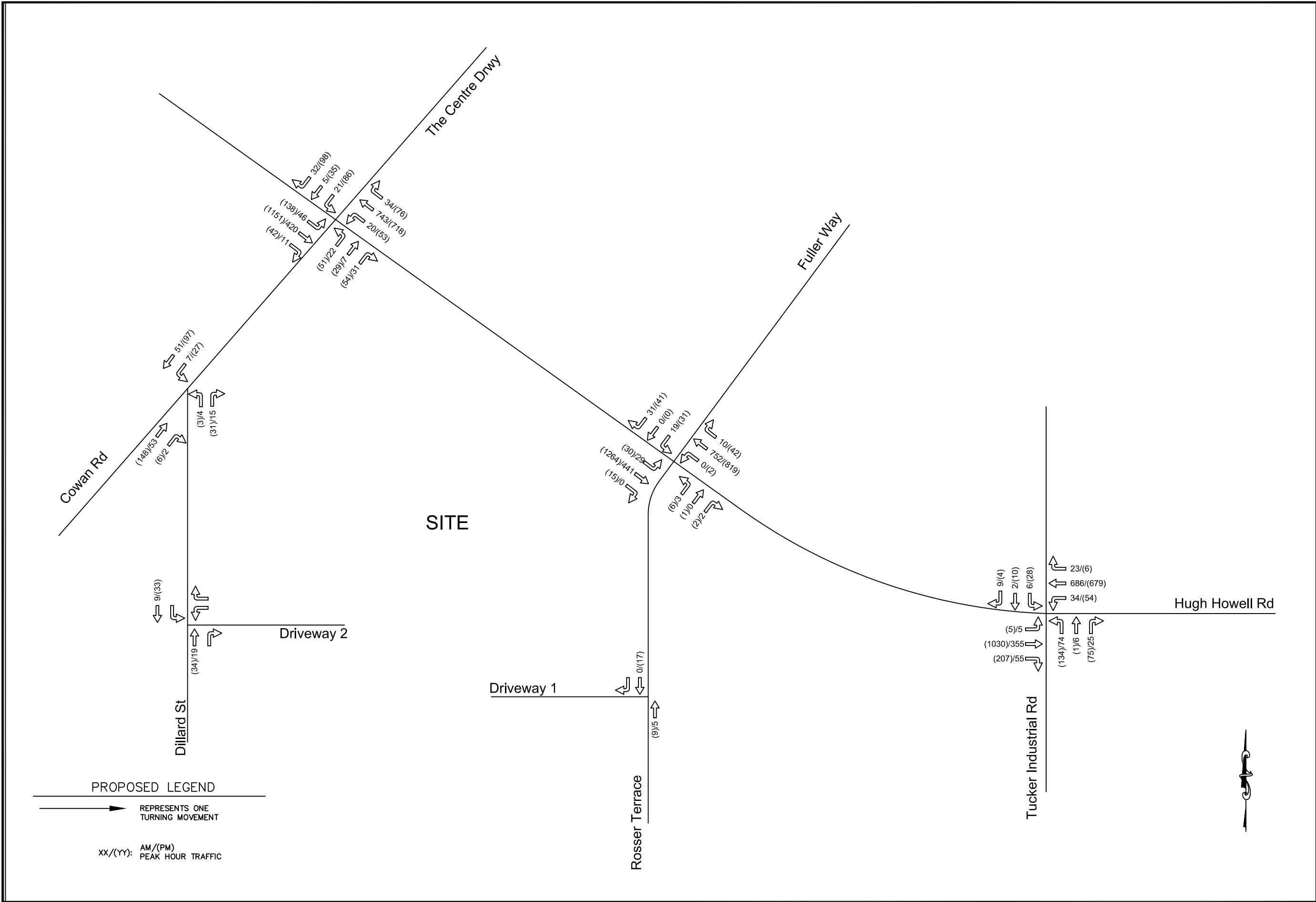
	Dillard St Northbound					Dillard St Southbound					Cowan Rd Eastbound					Cowan Rd Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM - 09:00 AM																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
7:45 AM	5	0	6	0	11	0	0	0	0	0	0	27	0	0	27	4	10	0	0	14	52
8:00 AM	2	0	5	0	7	0	0	0	0	0	0	13	1	0	14	3	9	0	0	12	33
8:15 AM	2	0	4	0	6	0	0	0	0	0	0	14	0	0	14	1	20	0	0	21	41
8:30 AM	0	0	2	0	2	0	0	0	0	0	0	16	1	0	17	1	9	0	0	10	29
Total Volume	9	0	17	0	26	0	0	0	0	0	0	70	2	0	72	9	48	0	0	57	155
% App. Total	34.6	0.0	65.4	0.0	100	0.0	0.0	0.0	0.0	0	0.0	97.2	2.8	0.0	100	15.8	84.2	0.0	0.0	100	
PHF	0.591										0.667					0.679					0.745
Cars, PU, Vans	9	0	17	0	26	0	0	0	0	0	0	67	1	0	68	9	44	0	0	53	147
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	95.7	50.0	0.0	94.4	100.0	91.7	0.0	0.0	93.0	94.8
Heavy trucks	0	0	0	0	0	0	0	0	0	0	0	3	1	0	4	0	4	0	0	4	8
% Heavy trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	50.0	0.0	5.6	0.0	8.3	0.0	0.0	7.0	5.2

PM

	Dillard St Northbound					Dillard St Southbound					Cowan Rd Eastbound					Cowan Rd Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 04:00 PM - 06:00 PM																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
5:00 PM	0	0	5	0	5	0	0	0	0	0	0	26	1	0	27	7	28	0	0	35	67
5:15 PM	2	0	6	0	8	0	0	0	0	0	0	36	0	0	36	6	30	0	0	36	80
5:30 PM	0	0	12	0	12	0	0	0	0	0	0	35	2	0	37	7	20	0	0	27	76
5:45 PM	0	0	6	0	6	0	0	0	0	0	0	37	1	0	38	7	19	0	0	26	70
Total Volume	2	0	29	0	31	0	0	0	0	0	0	134	4	0	138	27	97	0	0	124	293
% App. Total	6.5	0.0	93.5	0.0	100	0.0	0.0	0.0	0.0	0	0.0	97.1	2.9	0.0	100	21.8	78.2	0.0	0.0	100	
PHF	0.646										0.908					0.861					0.916
Cars, PU, Vans	2	0	29	0	31	0	0	0	0	0	0	134	3	0	137	27	97	0	0	124	292
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	75.0	0.0	99.3	100.0	100.0	0.0	0.0	100.0	99.7
Heavy trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
% Heavy trucks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.3

APPENDIX D





RM

DSGN

RM

DRAWN

DJ

CHKD

120005-01-049

PROJECT NUMBER

SCALE

NOT TO SCALE

EXHIBIT

2

Bowman

CONSULTING

Certificate of Authorization License No. 30462

2023 No Build Traffic Volumes

Chick-fil-A Tucker Development

4431 Hugh Howell Rd

TUCKER, GEORGIA

Bowman Consulting Group, Ltd.

4450 W Eau Gallie Blvd

Suite 144

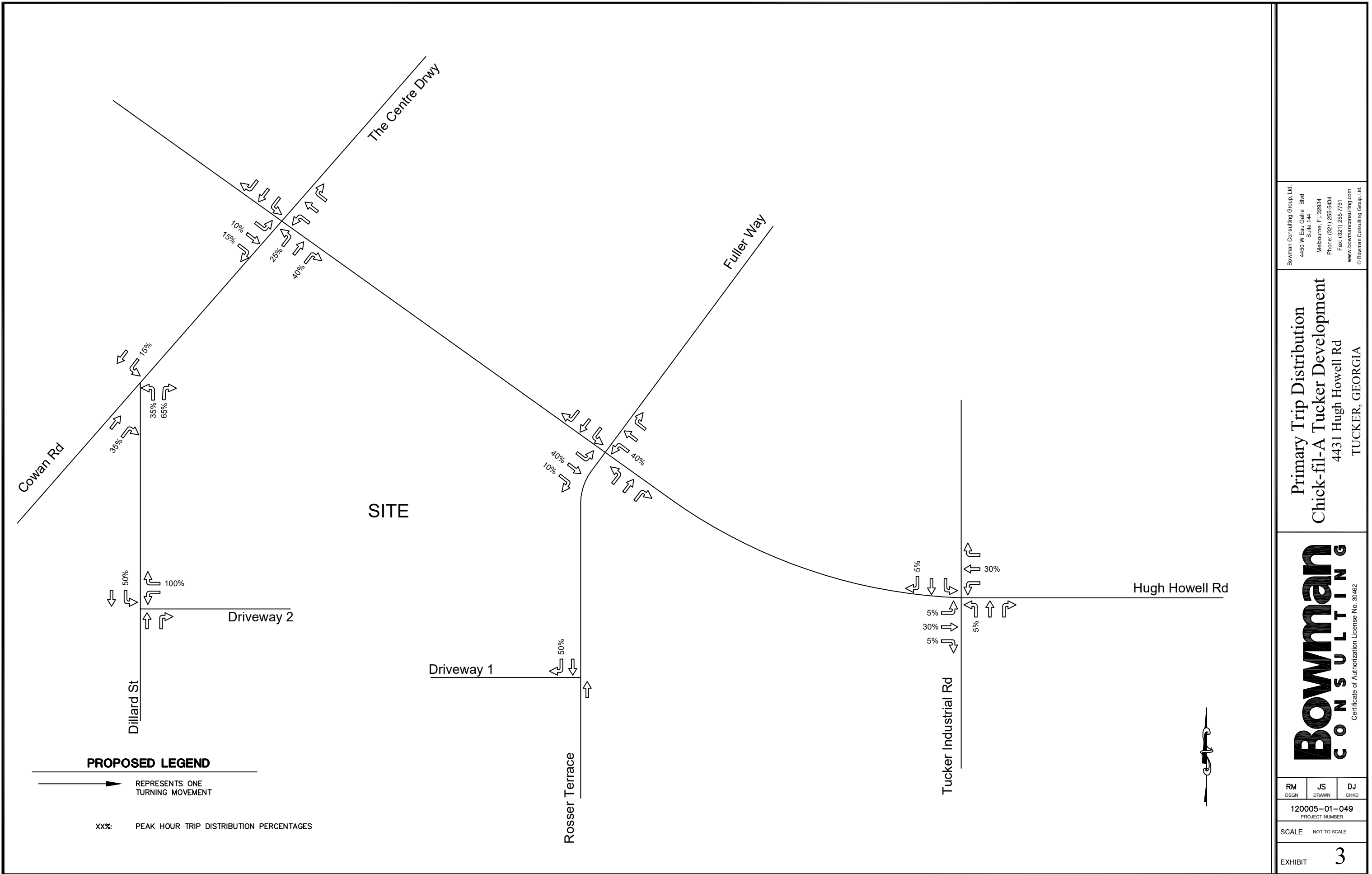
Melbourne, FL 32934

Phone: (321) 255-5434

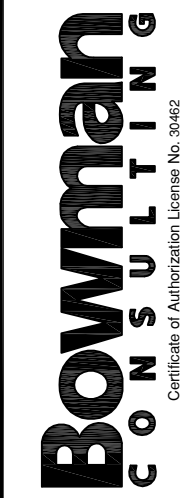
Fax: (321) 255-7751

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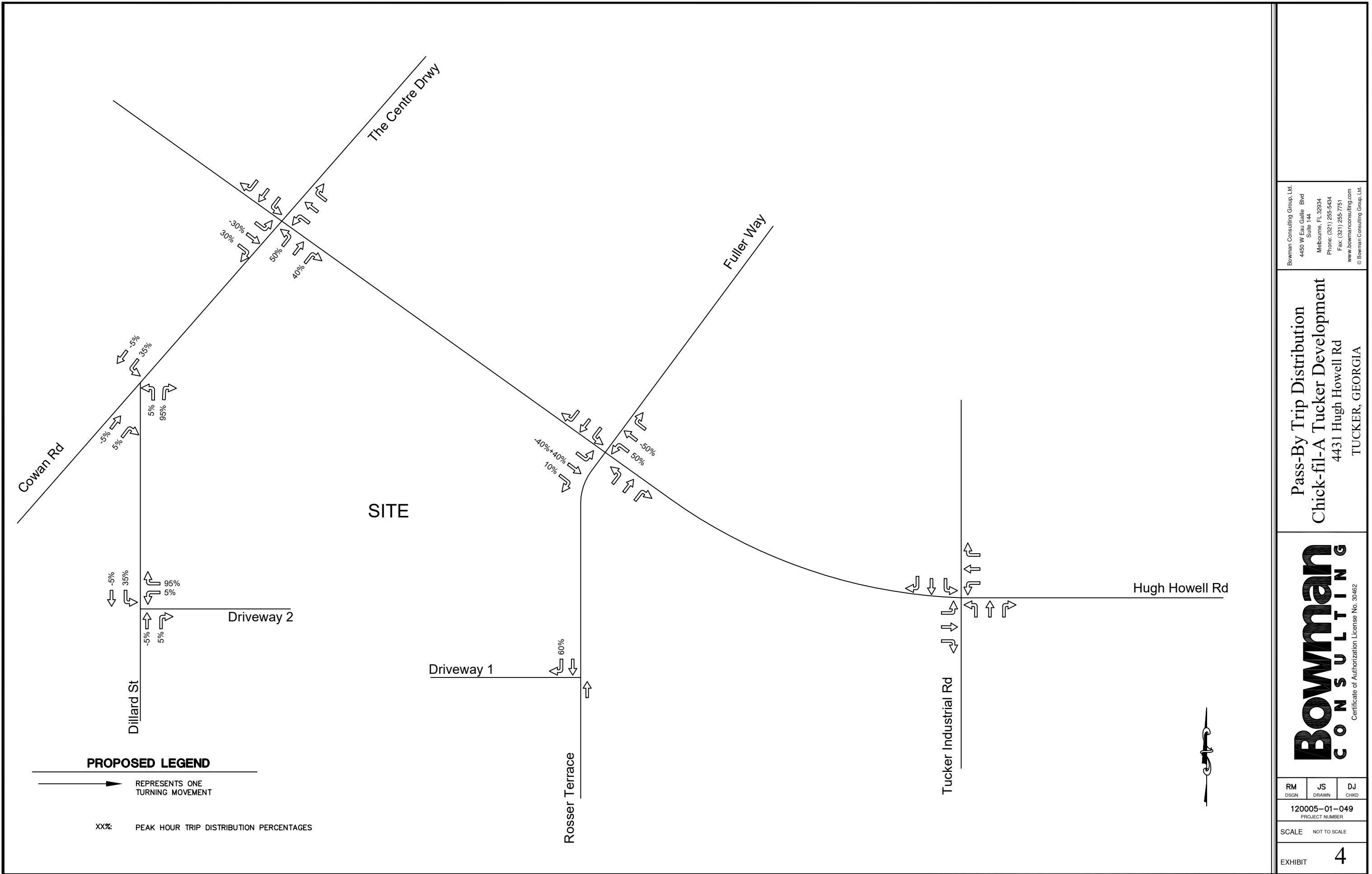


Primary Trip Distribution
Chick-fil-A Tucker Development
4431 Hugh Howell Rd
TUCKER, GEORGIA

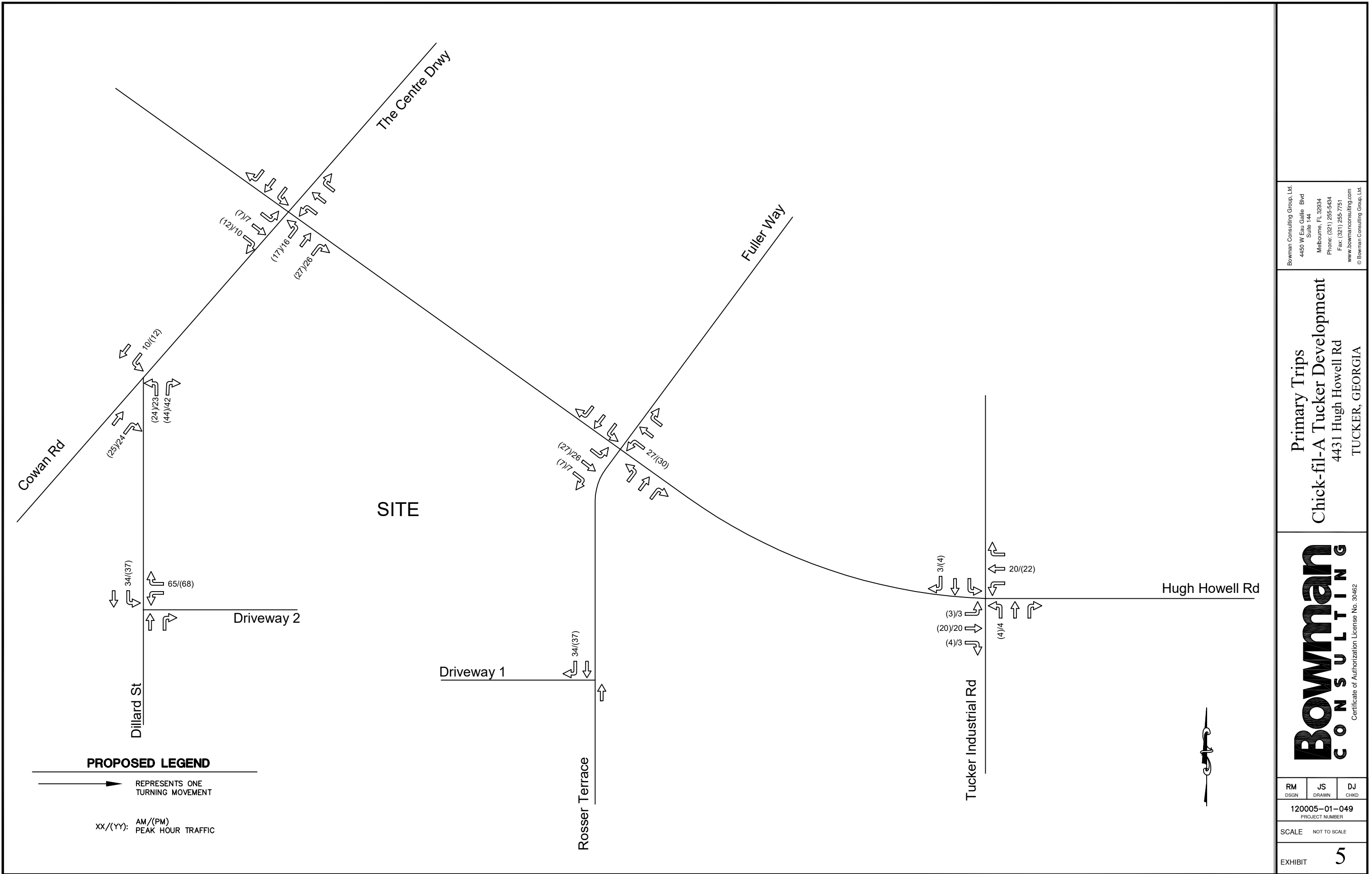


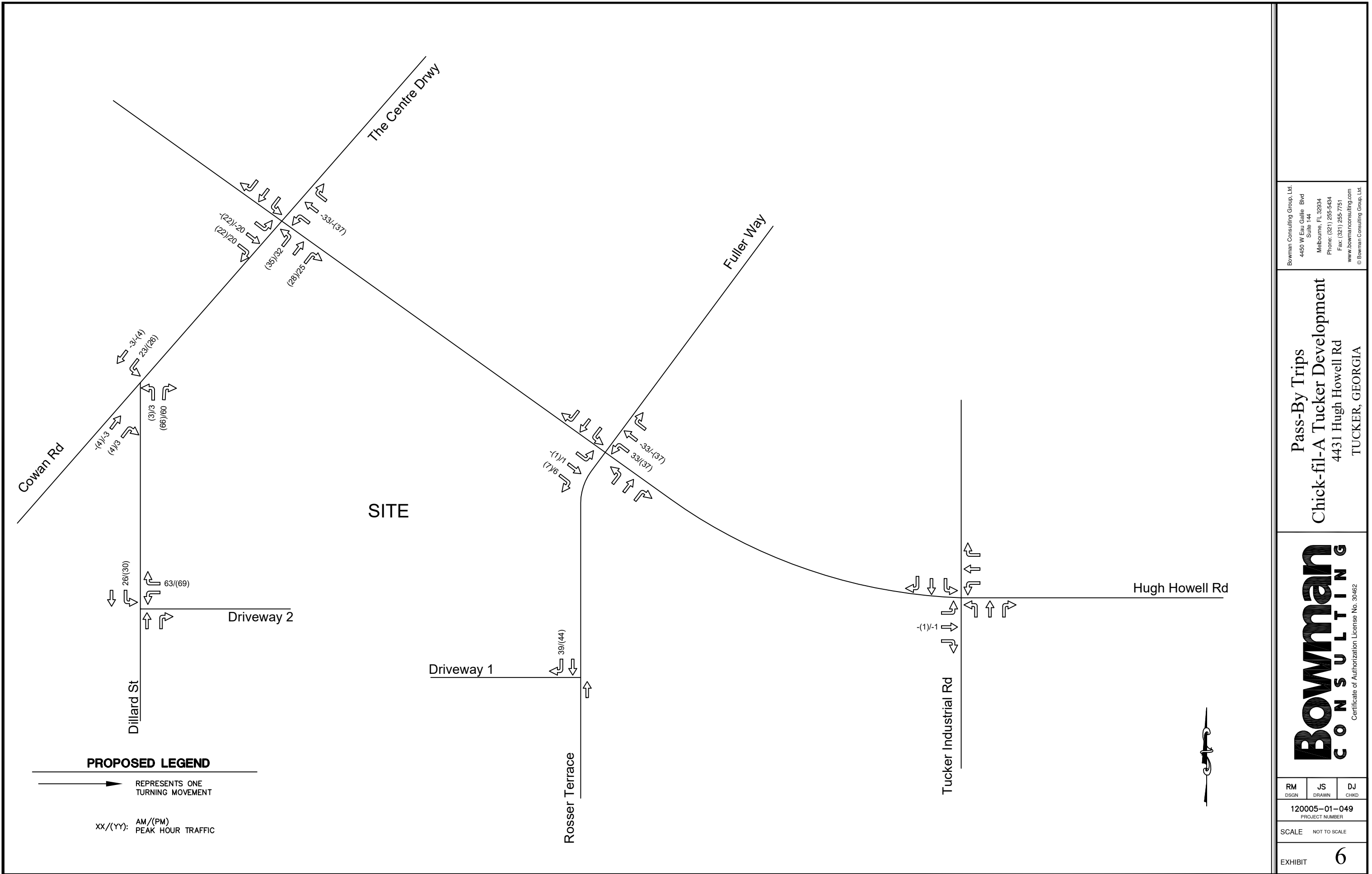
RM DSGN	JS DRAWN	DJ CHKD
120005-01-049 PROJECT NUMBER		
SCALE NOT TO SCALE		
EXHIBIT		3

Bowman Consulting Group, Ltd.
4450 W Eau Gallie Blvd
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PROPOSED LEGEND

→ REPRESENTS ONE TURNING MOVEMENT

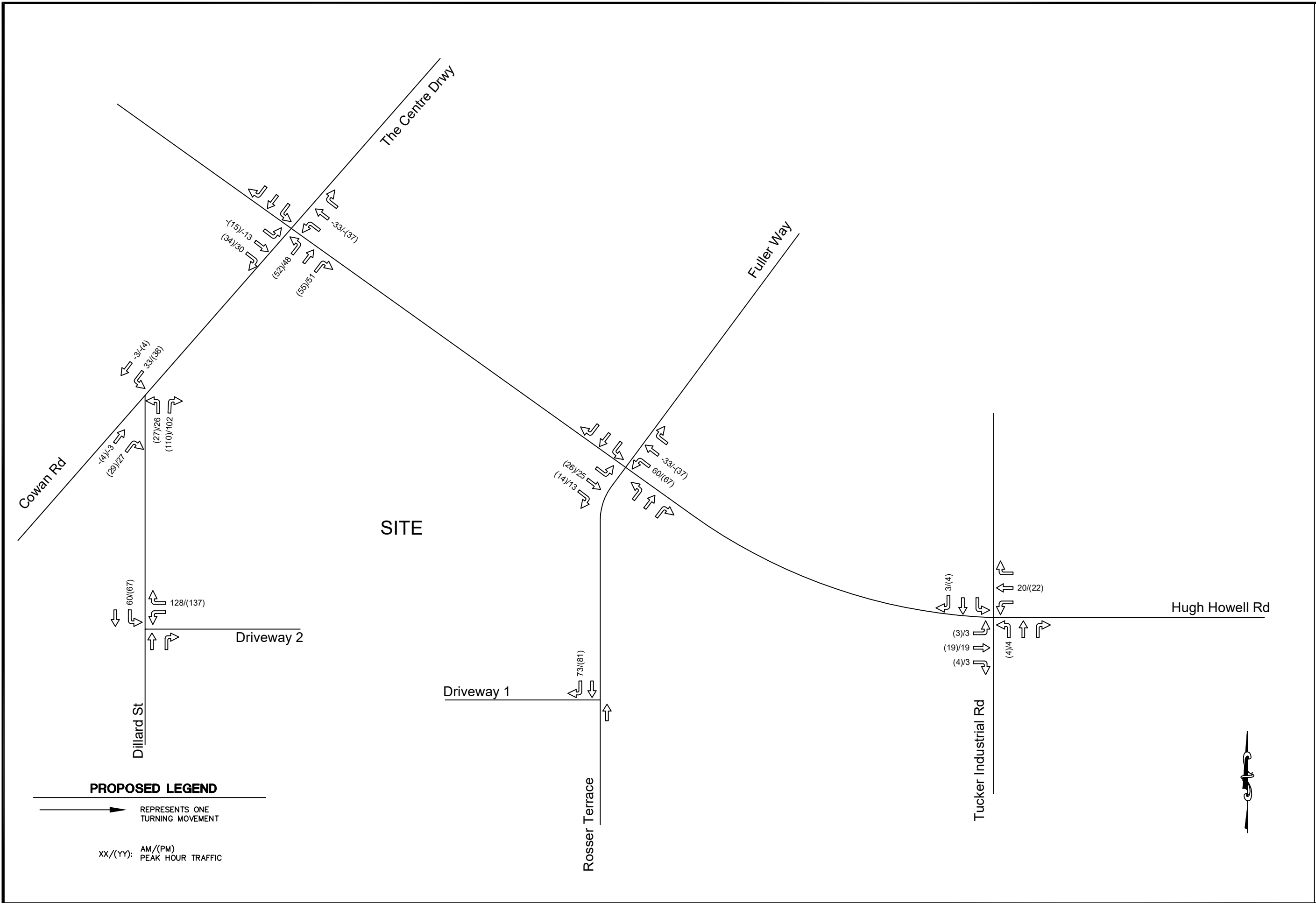
XX/(YY): AM/(PM)
PEAK HOUR TRAFFIC

Pass-By Trips
Chick-fil-A Tucker Development
4431 Hugh Howell Rd
TUCKER, GEORGIA

Bowman
CONSULTING
Certificate of Authorization License No. 30462

RM DSGN	JS DRAWN	DJ CHKD
120005-01-049 PROJECT NUMBER		
SCALE NOT TO SCALE		
EXHIBIT		6

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DSGN

JS
DRAWN

DJ
CHKD

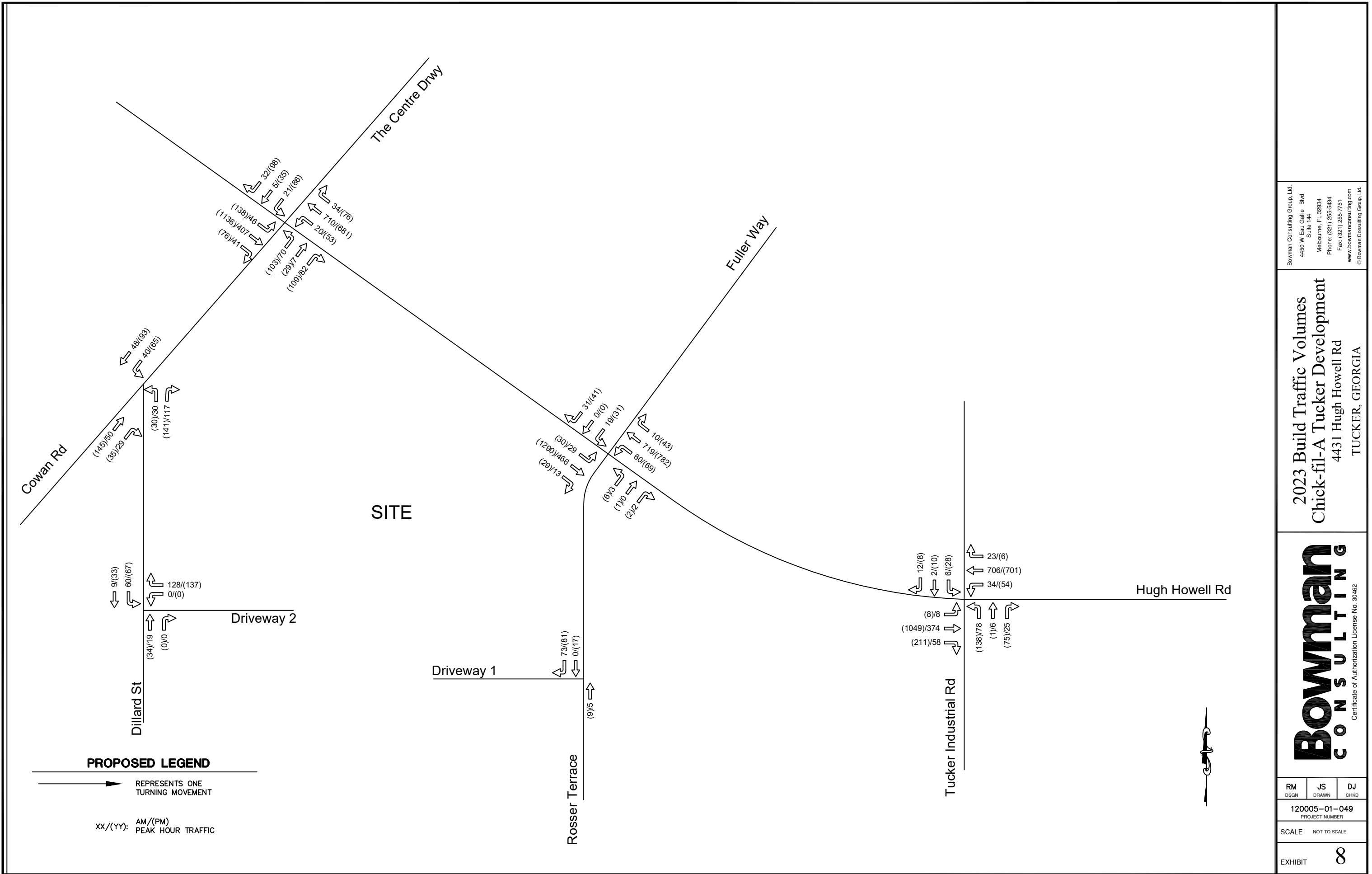
120005-01-049
PROJECT NUMBER

SCALE NOT TO SCALE

EXHIBIT 7

CFA Site Trips
Chick-fil-A Tucker Development
4431 Hugh Howell Rd
TUCKER, GEORGIA

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Melbourne, FL 32934
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2023 Build Traffic Volumes
Chick-fil-A Tucker Development
4431 Hugh Howell Rd
TUCKER, GEORGIA

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4450 W Eau Gallie Blvd
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RM DSGN	JS DRAWN	DJ CHKD
120005-01-049 PROJECT NUMBER		
SCALE NOT TO SCALE		
EXHIBIT		8

APPENDIX E

Memorandum

To: Chick-fil-A, Inc.

From: Andrew J. Petersen, P.E. - Director
Daniela Jurado – Analyst
Rodrigo Meirelles -Analyst

Date: 06/18/2021

Re: Chick-Fil-A – Trip Generation Memorandum

Bowman Consulting has been retained by Chick-fil-A, Inc. to perform a Trip Generation at three fully operational Chick-Fil-A (CFA) Restaurants to determine the expected morning and evening peak hour trip generation rates for this facilities.

The purposes of the trip generation and stacking assessment are as follows:

- Determine the appropriate independent variable to assess the applicable CFA trip generation rates.
- Determine the expected trip generation rates for the CFA based on data collected from three existing CFA Sites.
- Determine if the Institute of Transportation Engineers (ITE) trip generation rates are consistent with calculated expected number of vehicular trips on the proposed CFA.
- Select the appropriate trip generation rates for the proposed CFA.

Selected Sites

For the preparation of this assessment, three Chick-Fil-A sites have been evaluated. The following criteria has been considered for the site selection:

- Type of Facility (Chick-Fil-A Restaurant)
- Operation (Drive-thru and Indoor sitting)
- Location of the facilities

The following sites were selected for the data collection.

Location 1	<ul style="list-style-type: none">• Chick-Fil A Piedmont• Address: 2580 Piedmont Rd NE, Atlanta, GA 30324• Surveyed Site Intensity: 5,200 SF• AADT of Adjacent Street: 44,100
Location 2	<ul style="list-style-type: none">• Chick-Fil A Druid Hills• Address: 2340 N Druid Hills Rd NE, Atlanta, GA 30329• Surveyed Site Intensity: 4,550 SF• AADT of Adjacent Street: 56,300

Location 3

- **Chick-Fil A Northside Dr**
- **Address:** 1100 Northside Dr NW, Atlanta, GA 30318
- **Surveyed Site Intensity:** 4,450SF
- **AADT of Adjacent Street:** 30,300

Study Methodology

The study was based on average weekday entering/exiting volumes at each one of the selected Chick-Fil-A locations provided by the Atlanta Department of Transportation. The information corresponds to the average weekday data from two months in 2019 and February 2021 while school was in session.

The procedures and evaluation for this assessment are in accordance with the Institute of Traffic Engineers (ITE) Trip Generation Manual Handbook, 3rd Edition. The ITE is the leading resource for such data and provides traffic and parking related data for numerous land use and building types. Additionally, ITE provides trip and parking generation procedures to determine site specific trip and parking generation rates.

Data Collection

For the purposes of this study the following data was collected:

- Site specific data for existing Chick Fil A sites: Square Footage and location.
- Published GDOT AADT counts.
- ITE Trip Generation information and variables.
- Average trips generated by the surveyed Chick Fil A sites provided by the Atlanta Department of Transportation, see **Attachment A**.

Trip Generation Data

Table 1 displays the trip generation data collected on the three existing sites.

Table 1. Collected Trip Generation Data

Facility	Location	Square Footage	Adjacent Street ADTs	Time	In	Out	Total
CFA	2580 Piedmont Rd NE, Atlanta, GA 30324	5,200	44,100	AM	221	221	442
				PM	202	202	404
CFA	2340 N Druid Hills Rd NE Atlanta, GA 30329	4,550	56,300	AM	184	248	432
				Noon	306	412	718
				PM	192	308	500
CFA	1100 Northside Dr NW Atlanta, GA 30318	4,450	30,300	AM	262	262	524
				Noon	263	263	526
				PM	164	164	328

To assess the trip generation rates for the Chick-Fil-A two independent variables were evaluated: Gross Floor Area (GFA), AADT Adjacent Street.

To select the independent variables, the best fitted curve models were evaluated based on the conceptual validity of signs of the equations and goodness of fit. The results of these evaluation are presented in **Table 2**.

Table 2. Trip Generation Model evaluation

Model	Independent Variable	Equation	R ²	Signs Conceptually Valid	Acceptable Goodness of FIT
AM Models	1,000 SF GFA	$y = -64.523x + 771.41$	0.271	No	No
	AADT of Adjacent Street	$y = -0.0036x + 622.44$	0.8563	No	Yes
PM Models	1,000 SF GFA	$y = 11.859x + 354.53$	0.0031	Yes	No
	AADT of Adjacent Street	$y = 0.0066x + 123.51$	0.9895	Yes	Yes

Models containing the GFA variable were found to be not conceptually valid, with equations that reflect an inverse relationship between the GFA and the number of trips generated by the site and unacceptable goodness of fit.

Models using AADT of Adjacent Street as independent variable show acceptable goodness of fit. However, the AM model Based on AADT of adjacent street shows signs non conceptually valid, therefore, the weighted average was evaluated for this time period.

Based on the results presented in **Table 2** the Adjacent Street Traffic was selected as independent variable for both the morning and evening peak hours.

Following the procedures presented on the ITE *trip generation Handbook*, Chapter 9 and Appendix J, the use of the weighted average rate for the Morning peak was validated by comparing the weighted standard deviation with the weighted Average trip rate. **Table 3** presents the validation for the use of weighted average for the morning peak hour trip rate.

Table 3. Validation of AM Weighted average trip generation

Location	AADT of adjacent Steet	Peak Hour AM	Trip rate	Value	Value Squared	weight	Value Squared *weight
2580 Piedmont Rd	44,100	442	0.01002	0.00	0.0000005	0.34	0.00000015
2340 N Druid Hills Rd	56,300	432	0.00767	0.00	0.0000091	0.43	0.00000394
1100 Northside Dr	30,300	524	0.01729	0.01	0.0000435	0.23	0.00001009
Total	130,700.00	1,398.00	0.01070	-	Variance		0.00001418
Weighted Sample Variance							0.00001773
Weighted Std Dev							0.00
Percentage of W StdDev							39%
Acceptable (less than 55% Trip Rate)							Yes

As presented in **Table 3** the standard deviation of the data falls in the allowable 55% threshold according to the procedures presented on the ITE trip generation Handbook, Chapter 9 and Appendix J, therefore, the use of weighted average trip generation rate is acceptable.

The selected trip generation equations for CFA facilities are presented in **Table 4**.

Table 4. Trip Generation equations for CFA facilities

Model	Independent Variable	Equation
AM	AADT of Adjacent Street	$Total\ AM\ CFA\ trips = 0.0107 \times AADT\ of\ Adjacent\ Street$
PM	AADT of Adjacent Street	$Total\ PM\ CFA\ trips = 0.0066 \times AADT\ of\ Adjacent\ Street + 123.51$

The evening peak hour model is the resulting fitted curve with AADT of adjacent street as independent variable. The trip generation rate for the morning peak hour is 0.0107 trips/AADT of Adjacent Street Traffic.

Conclusions and Recommendations

- Both, the morning and evening models containing the GFA variable were found to have unacceptable goodness of fit, the morning models is not conceptually valid, with an

equation that reflects an inverse relationship between the GFA, and the number of trips generated by the site.

- Models using AADT of Adjacent Street as independent variable show acceptable goodness of fit.
- The evening peak hour model is fitted curve with AADT of adjacent street as independent variable.
- The AM model Based on AADT of adjacent street shows signs non conceptually valid therefore, the weighted average was evaluated for this time period.
- The evaluation of the data for the morning peak hour shows that the standard deviation of the data falls in the allowable 55% threshold according to the procedures presented on the ITE trip generation Handbook, Chapter 9 and Appendix J, therefore, the use of weighted average trip generation rate is acceptable.
- The trip generation rate for the morning peak hour is 0.0107 trips/AADT of Adjacent Street Traffic.

ATTACHMENT A

From: Rome, Christopher <crome@AtlantaGa.Gov>
Sent: Wednesday, June 9, 2021 10:32 AM
To: Daniela Jurado; Rodriguez, Juan C.; Moore, Clyde
Cc: Rodrigo Meirelles; Andrew Petersen; Bridgette Ganter; Smoot-Madison, Betty; Brown, Barrington G.
Subject: [EXTERNAL] RE: Traffic Impact Study Methodology Chick-Fil-A Cheshire Bridge Rd & Sheridan Rd

1100 Northside Dr

- AM Peak – 262 trips in, assume 262 trips out– 524 total trips
- Noon Peak – 263 trips in, assume 263 trips out – 526 total trips
- PM Peak – 164 trips in, assume 164 trips out – 328 total trips

Have you contacted GDOT's RTOP program or collected TMC's already at the I-85 ramps? That data will be more accurate than StreetLight Insight TMCs which are still in beta.

Chris Rome, PE, PTOE

Senior Multimodal Transportation Engineer
City of Atlanta Department of Transportation
470-653-3016
crome@atlantaga.gov

From: Daniela Jurado <djurado@bowman.com>
Sent: Wednesday, June 9, 2021 8:39 AM
To: Rome, Christopher <crome@AtlantaGa.Gov>; Rodriguez, Juan C. <JCRodriguez@AtlantaGa.Gov>; Moore, Clyde <CMoore@AtlantaGa.Gov>
Cc: Rodrigo Meirelles <rmeirelles@bowman.com>; Andrew Petersen <apetersen@bowman.com>; Bridgette Ganter <bganter@bowman.com>; Smoot-Madison, Betty <bsmoot-madison@AtlantaGa.Gov>; Brown, Barrington G. <BGBrown@AtlantaGa.Gov>
Subject: [EXTERNAL] RE: Traffic Impact Study Methodology Chick-Fil-A Cheshire Bridge Rd & Sheridan Rd

Good Morning Chris,

Would it be possible to also pull out the Turning movements for Cheshire Bridge at I-85 ramps for the am noon and pm?

Thank you,

DANIELA JURADO

Project Manager | **BOWMAN**
4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934
O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762
djurado@bowman.com | bowman.com



From: Rome, Christopher <crome@AtlantaGa.Gov>
Sent: Tuesday, June 8, 2021 7:09 PM
To: Daniela Jurado <djurado@bowman.com>; Rodriguez, Juan C. <JCRodriguez@AtlantaGa.Gov>; Moore, Clyde <CMoore@AtlantaGa.Gov>
Cc: Rodrigo Meirelles <rmeirelles@bowman.com>; Andrew Petersen <apetersen@bowman.com>; Bridgette Ganter <bganter@bowman.com>; Smoot-Madison, Betty <bsmoot-madison@AtlantaGa.Gov>; Brown, Barrington G. <BGBrown@AtlantaGa.Gov>
Subject: [EXTERNAL] RE: Traffic Impact Study Methodology Chick-Fil-A Cheshire Bridge Rd & Sheridan Rd

Tucker is outside of our data licensing geographic limits.
I'll pull the data from the Northside Dr site tomorrow.

Chris Rome, PE, PTOE

Senior Multimodal Transportation Engineer
City of Atlanta Department of Transportation
470-653-3016
crome@atlantaga.gov

From: Daniela Jurado <djurado@bowman.com>
Sent: Tuesday, June 8, 2021 7:00 PM
To: Rome, Christopher <crome@AtlantaGa.Gov>; Rodriguez, Juan C. <JCRodriguez@AtlantaGa.Gov>; Moore, Clyde <CMoore@AtlantaGa.Gov>
Cc: Rodrigo Meirelles <rmeirelles@bowman.com>; Andrew Petersen <apetersen@bowman.com>; Bridgette Ganter <bganter@bowman.com>; Smoot-Madison, Betty <bsmoot-madison@AtlantaGa.Gov>; Brown, Barrington G. <BGBrown@AtlantaGa.Gov>
Subject: [EXTERNAL] RE: Traffic Impact Study Methodology Chick-Fil-A Cheshire Bridge Rd & Sheridan Rd

Thank you for the information. We would like to have the information for the following sites:

Location	AADT
<i>1100 Northside Dr NW</i>	30,300
<i>4340 Hugh Howell Rd, Tucker, GA 30084</i>	25,300

The reason is, we also want to evaluate the trip generation based on the AADT of adjacent street.

Thank you in advance.

Sincerely,

DANIELA JURADO

Project Manager | **BOWMAN**
4450 W Eau Gallie Boulevard, Suite 144, Melbourne, FL 32934
O: (321) 270-8905 | D: (321) 270-8977 | M: (786) 370-2762
djurado@bowman.com | bowman.com



From: Rome, Christopher <crome@AtlantaGa.Gov>

Sent: Tuesday, June 8, 2021 5:21 PM

To: Daniela Jurado <djurado@bowman.com>; Rodriguez, Juan C. <JCRodriguez@AtlantaGa.Gov>;

Moore, Clyde <CMoore@AtlantaGa.Gov>

Cc: Rodrigo Meirelles <rmeirelles@bowman.com>; Andrew Petersen <apetersen@bowman.com>;

Bridgette Ganter <bganter@bowman.com>; Smoot-Madison, Betty <bsmoot-madison@AtlantaGa.Gov>;

Brown, Barrington G. <BGBrown@AtlantaGa.Gov>

Subject: [EXTERNAL] RE: Traffic Impact Study Methodology Chick-Fil-A Cheshire Bridge Rd & Sheridan Rd

I think it depends on the site characteristics if the Miami site is similar.

I used our StreetLight Data Insight platform access to look at the number of trips entering two Chick-fil-A locations in Atlanta. This is average weekday (M-Th) information from 2 months in 2019 and February 2021 when school was in session. The 1 standard deviation from the ITE land use code trip generation seems too low for an accurate assessment of site impact. If you have a specific site location in Atlanta that you think will be more representative of the conditions for the proposed site at Cheshire Bridge and Sheridan Rd, let me know and I can pull data for those locations.

2580 Piedmont Rd

- AM Peak – 221 trips in, assume 221 trips out– 442 total trips
- Noon Peak – 332 trips in, assume 332 trips out – 664 total trips
- PM Peak – 202 trips in, assume 202 trips out – 404 total trips

2340 N Druid Hills Rd

- AM Peak – 184 trips in, 248 trips out– 432 total trips
- Noon Peak – 306 trips in, 412 trips out – 718 total trips
- PM Peak – 192 trips in, 308 trips out – 500 total trips

Chris Rome, PE, PTOE

Senior Multimodal Transportation Engineer

City of Atlanta Department of Transportation

470-653-3016

crome@atlantaga.gov

From: Daniela Jurado <djurado@bowman.com>

Sent: Tuesday, June 8, 2021 2:36 PM

To: Rome, Christopher <crome@AtlantaGa.Gov>; Rodriguez, Juan C. <JCRodriguez@AtlantaGa.Gov>;

Moore, Clyde <CMoore@AtlantaGa.Gov>

Cc: Rodrigo Meirelles <rmeirelles@bowman.com>; Andrew Petersen <apetersen@bowman.com>;

Bridgette Ganter <bganter@bowman.com>; Smoot-Madison, Betty <bsmoot-madison@AtlantaGa.Gov>;

Brown, Barrington G. <BGBrown@AtlantaGa.Gov>

Subject: [EXTERNAL] RE: Traffic Impact Study Methodology Chick-Fil-A Cheshire Bridge Rd & Sheridan Rd




















Good Afternoon Chris,








APPENDIX F

2023 NO BUILD CONDITIONS Capacity Analysis

Lanes, Volumes, Timings
1: Rosser Terrace/Fuller Way & Hugh Howell Rd

2023 NO BUILD - AM
03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	441	0	0	752	10	3	0	2	19	0	31
Future Volume (vph)	29	441	0	0	752	10	3	0	2	19	0	31
Adj. Flow (vph)	31	474	0	0	809	11	3	0	2	20	0	33
Lane Group Flow (vph)	31	474	0	0	809	11	0	5	0	0	53	0
Sign Control	Free			Free			Stop			Stop		
Intersection Summary												
Control Type: Unsignalized												
Intersection Capacity Utilization 34.1% ICU Level of Service A												
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	441	0	0	752	10	3	0	2	19	0	31
Future Vol, veh/h	29	441	0	0	752	10	3	0	2	19	0	31
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	7	3	0	0	2	10	33	0	0	10	0	0
Mvmt Flow	31	474	0	0	809	11	3	0	2	20	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	821	0	0	475	0	0	942	1358	238	1109	1347	406
Stage 1	-	-	-	-	-	-	537	537	-	810	810	-
Stage 2	-	-	-	-	-	-	405	821	-	299	537	-
Critical Hdwy	4.24	-	-	4.1	-	-	8.16	6.5	6.9	7.7	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	7.16	5.5	-	6.7	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.16	5.5	-	6.7	5.5	-
Follow-up Hdwy	2.27	-	-	2.2	-	-	3.83	4	3.3	3.6	4	3.3
Pot Cap-1 Maneuver	1139	-	-	*1369	-	-	*533	444	*912	*568	455	*796
Stage 1	-	-	-	-	-	-	*723	712	-	*726	655	-
Stage 2	-	-	-	-	-	-	*687	645	-	*837	712	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	1138	-	-	*1368	-	-	*500	431	*911	*554	442	*796
Mov Cap-2 Maneuver	-	-	-	-	-	-	*528	491	-	*593	508	-
Stage 1	-	-	-	-	-	-	*702	692	-	*706	654	-
Stage 2	-	-	-	-	-	-	*658	644	-	*812	692	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	10.7	9.7
HCM LOS			B	A





















Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	635	1138	-	-	*1368	-	-	796
HCM Lane V/C Ratio	0.008	0.027	-	-	-	-	-	0.042
HCM Control Delay (s)	10.7	8.3	-	-	0	-	-	9.7
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.1

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

Lanes, Volumes, Timings
2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 NO BUILD - AM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	420	11	20	743	34	22	7	31	21	5	32
Future Volume (vph)	46	420	11	20	743	34	22	7	31	21	5	32
Adj. Flow (vph)	49	452	12	22	799	37	24	8	33	23	5	34
Lane Group Flow (vph)	49	464	0	22	799	37	0	65	0	23	39	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		7	4	
Permitted Phases	6			2		2	8			4		
Detector Phase	1	6		5	2	2	8	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	10.0		5.0	10.0	10.0	7.0	7.0		5.0	7.0	
Minimum Split (s)	13.2	27.4		10.3	32.1	32.1	35.5	35.5		11.1	35.5	
Total Split (s)	26.0	85.0		17.0	76.0	76.0	42.0	42.0		16.0	58.0	
Total Split (%)	16.3%	53.1%		10.6%	47.5%	47.5%	26.3%	26.3%		10.0%	36.3%	
Maximum Green (s)	19.8	78.9		11.7	69.9	69.9	35.5	35.5		9.9	51.5	
Yellow Time (s)	3.4	4.6		3.1	4.6	4.6	3.5	3.5		3.1	3.5	
All-Red Time (s)	2.8	1.5		2.2	1.5	1.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.1		5.3	6.1	6.1		6.5		6.1	6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0	3.0	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0	10.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)		10.0			19.0	19.0	22.0	22.0			22.0	
Pedestrian Calls (#/hr)		0			0	0	0	0			0	
Act Effct Green (s)	126.1	121.8		123.8	118.1	118.1		9.6		19.0	18.6	
Actuated g/C Ratio	0.79	0.76		0.77	0.74	0.74		0.06		0.12	0.12	
v/c Ratio	0.09	0.18		0.03	0.31	0.03		0.55		0.17	0.19	
Control Delay	5.0	7.1		4.5	8.0	0.1		58.3		60.5	21.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	5.0	7.1		4.5	8.0	0.1		58.3		60.5	21.6	
LOS	A	A		A	A	A		E		E	C	
Approach Delay		6.9			7.6			58.3			36.0	
Approach LOS		A			A			E			D	
Queue Length 50th (ft)	10	79		4	144	0		36		21	5	
Queue Length 95th (ft)	25	120		12	202	0		88		48	40	
Internal Link Dist (ft)		969			335			119			430	
Turn Bay Length (ft)	125			115								
Base Capacity (vph)	634	2603		801	2561	1202		361		147	519	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.08	0.18		0.03	0.31	0.03		0.18		0.16	0.08	
Intersection Summary												

Lanes, Volumes, Timings

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 NO BUILD - AM

03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 148.9 (93%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 10.7

Intersection LOS: B

Intersection Capacity Utilization 53.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Cowan Rd/The Centre Driveway & Hugh Howell Rd























HCM 6th Signalized Intersection Summary

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 NO BUILD - AM



















03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	420	11	20	743	34	22	7	31	21	5	32
Future Volume (veh/h)	46	420	11	20	743	34	22	7	31	21	5	32
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1826	1826	1900	1841	1900	1900	1900	1900	1752	1900	1900
Adj Flow Rate, veh/h	49	452	12	22	799	37	24	8	33	23	5	34
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	5	5	0	4	0	0	0	0	10	0	0
Cap, veh/h	603	2612	69	759	2558	1177	56	17	43	148	24	161
Arrive On Green	0.04	0.76	0.76	0.04	1.00	1.00	0.05	0.05	0.05	0.02	0.11	0.11
Sat Flow, veh/h	1810	3452	92	1810	3497	1609	471	309	804	1668	211	1432
Grp Volume(v), veh/h	49	227	237	22	799	37	65	0	0	23	0	39
Grp Sat Flow(s),veh/h/ln	1810	1735	1809	1810	1749	1609	1583	0	0	1668	0	1642
Q Serve(g_s), s	1.0	5.9	5.9	0.5	0.0	0.0	4.9	0.0	0.0	2.0	0.0	3.5
Cycle Q Clear(g_c), s	1.0	5.9	5.9	0.5	0.0	0.0	6.4	0.0	0.0	2.0	0.0	3.5
Prop In Lane	1.00		0.05	1.00		1.00	0.37		0.51	1.00		0.87
Lane Grp Cap(c), veh/h	603	1312	1369	759	2558	1177	116	0	0	148	0	184
V/C Ratio(X)	0.08	0.17	0.17	0.03	0.31	0.03	0.56	0.00	0.00	0.16	0.00	0.21
Avail Cap(c_a), veh/h	757	1312	1369	856	2558	1177	376	0	0	218	0	529
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	4.3	5.5	5.5	4.9	0.0	0.0	74.6	0.0	0.0	67.7	0.0	64.6
Incr Delay (d2), s/veh	0.1	0.3	0.3	0.0	0.3	0.0	4.1	0.0	0.0	0.5	0.0	0.6
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	0.3	2.0	2.1	0.2	0.1	0.0	2.8	0.0	0.0	0.9	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.4	5.7	5.7	4.9	0.3	0.0	78.7	0.0	0.0	68.2	0.0	65.2
LnGrp LOS	A	A	A	A	A	A	E	A	A	E	A	E
Approach Vol, veh/h	513		858				65		62			
Approach Delay, s/veh	5.6		0.4				78.7		66.3			
Approach LOS	A		A				E		E			
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.4	123.1		24.4	8.4	127.1	9.3	15.1				
Change Period (Y+Rc), s	* 6.2	6.1		6.5	* 5.3	6.1	6.1	6.5				
Max Green Setting (Gmax), s	* 20	69.9		51.5	* 12	78.9	9.9	35.5				
Max Q Clear Time (g_c+I1), s	3.0	2.0		5.5	2.5	7.9	4.0	8.4				
Green Ext Time (p_c), s	0.1	13.6		0.2	0.0	5.9	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	8.3											
HCM 6th LOS	A											
Notes												

Lanes, Volumes, Timings
3: Tucker Industrial Rd & Hugh Howell Rd

2023 NO BUILD - AM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	355	55	34	686	23	74	6	25	6	2	9
Future Volume (vph)	5	355	55	34	686	23	74	6	25	6	2	9
Adj. Flow (vph)	6	394	61	38	762	26	82	7	28	7	2	10
Lane Group Flow (vph)	6	455	0	38	788	0	0	117	0	0	19	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.1	31.4		10.9	31.4		31.1	31.1		33.9	33.9	
Total Split (s)	15.0	89.0		15.0	89.0		56.0	56.0		56.0	56.0	
Total Split (%)	9.4%	55.6%		9.4%	55.6%		35.0%	35.0%		35.0%	35.0%	
Maximum Green (s)	8.9	82.6		9.1	82.6		49.9	49.9		50.1	50.1	
Yellow Time (s)	3.5	4.7		3.3	4.7		3.3	3.3		3.0	3.0	
All-Red Time (s)	2.6	1.7		2.6	1.7		2.8	2.8		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.4		5.9	6.4			6.1			5.9	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0		0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	15.0		0.0	15.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		18.0	18.0		21.0	21.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effect Green (s)	6.2	116.9		9.1	127.0			17.8			18.0	
Actuated g/C Ratio	0.04	0.73		0.06	0.79			0.11			0.11	
v/c Ratio	0.09	0.18		0.42	0.29			0.72			0.10	
Control Delay	67.4	9.2		85.4	5.6			85.2			38.4	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	67.4	9.2		85.4	5.6			85.2			38.4	
LOS	E	A		F	A			F			D	
Approach Delay		9.9			9.3			85.2			38.4	
Approach LOS		A			A			F			D	
Queue Length 50th (ft)	5	108		39	90			110			9	
Queue Length 95th (ft)	20	171		79	203			175			35	
Internal Link Dist (ft)		1068			568			739			1148	
Turn Bay Length (ft)	150			100								
Base Capacity (vph)	100	2462		101	2760			439			539	
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	0.06	0.18		0.38	0.29			0.27			0.04	
Intersection Summary												

Lanes, Volumes, Timings 3: Tucker Industrial Rd & Hugh Howell Rd

2023 NO BUILD - AM
03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 38.6 (24%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 16.1

Intersection LOS: B

Intersection Capacity Utilization 50.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Tucker Industrial Rd & Hugh Howell Rd































HCM 6th Signalized Intersection Summary




3: Tucker Industrial Rd & Hugh Howell Rd

2023 NO BUILD - AM

03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	355	55	34	686	23	74	6	25	6	2	9
Future Volume (veh/h)	5	355	55	34	686	23	74	6	25	6	2	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1826	1826	1722	1856	1856	1900	1976	1900	1900	1976	1900
Adj Flow Rate, veh/h	6	394	61	38	762	26	82	7	28	7	2	10
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	5	5	12	3	3	0	0	0	0	0	0
Cap, veh/h	13	2297	353	48	2730	93	139	10	35	76	30	83
Arrive On Green	0.01	1.00	1.00	0.03	0.78	0.78	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	1810	3005	461	1640	3478	119	1099	104	378	489	333	913
Grp Volume(v), veh/h	6	226	229	38	386	402	117	0	0	19	0	0
Grp Sat Flow(s),veh/h/ln	1810	1735	1731	1640	1763	1834	1581	0	0	1735	0	0
Q Serve(g_s), s	0.5	0.0	0.0	3.7	9.6	9.7	10.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.5	0.0	0.0	3.7	9.6	9.7	11.5	0.0	0.0	1.5	0.0	0.0
Prop In Lane	1.00		0.27	1.00		0.06	0.70		0.24	0.37		0.53
Lane Grp Cap(c), veh/h	13	1326	1324	48	1384	1440	183	0	0	189	0	0
V/C Ratio(X)	0.45	0.17	0.17	0.80	0.28	0.28	0.64	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	101	1326	1324	93	1384	1440	523	0	0	545	0	0
HCM Platoon Ratio	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	78.5	0.0	0.0	77.2	4.7	4.7	71.1	0.0	0.0	66.7	0.0	0.0
Incr Delay (d2), s/veh	22.3	0.3	0.3	25.3	0.5	0.5	3.7	0.0	0.0	0.2	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	0.3	0.1	0.1	1.9	3.2	3.3	4.9	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	100.8	0.3	0.3	102.5	5.2	5.2	74.8	0.0	0.0	67.0	0.0	0.0
LnGrp LOS	F	A	A	F	A	A	E	A	A	E	A	A
Approach Vol, veh/h	461		826				117			19		
Approach Delay, s/veh	1.6		9.7				74.8			67.0		
Approach LOS	A		A				E			E		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.3	132.0		20.7	10.5	128.7		20.7				
Change Period (Y+Rc), s	6.1	* 6.4		6.1	* 5.9	* 6.4		* 6.1				
Max Green Setting (Gmax), s	8.9	* 83		49.9	* 9.1	* 83		* 50				
Max Q Clear Time (g_c+I1), s	2.5	11.7		13.5	5.7	2.0		3.5				
Green Ext Time (p_c), s	0.0	11.8		0.6	0.0	5.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay			13.2									
HCM 6th LOS			B									
Notes												




















						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations					 	
Traffic Volume (vph)	53	2	7	51	4	15
Future Volume (vph)	53	2	7	51	4	15
Adj. Flow (vph)	72	3	9	69	5	20
Lane Group Flow (vph)	75	0	0	78	25	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 18.6%				ICU Level of Service A		
Analysis Period (min) 15						








Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	53	2	7	51	4	15
Future Vol, veh/h	53	2	7	51	4	15
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	4	50	0	8	0	0
Mvmt Flow	72	3	9	69	5	20
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	75	0	162	74
Stage 1	-	-	-	-	74	-
Stage 2	-	-	-	-	88	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1537	-	834	993
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1537	-	828	993
Mov Cap-2 Maneuver	-	-	-	-	828	-
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	933	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.9		8.9	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	953	-	-	1537	-	
HCM Lane V/C Ratio	0.027	-	-	0.006	-	
HCM Control Delay (s)	8.9	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

Lanes, Volumes, Timings
1: Rosser Terrace/Fuller Way & Hugh Howell Rd

2023 NO BUILD - PM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1264	15	2	819	43	6	1	2	31	0	41
Future Volume (vph)	30	1264	15	2	819	43	6	1	2	31	0	41
Adj. Flow (vph)	31	1317	16	2	853	45	6	1	2	32	0	43
Lane Group Flow (vph)	31	1333	0	2	853	45	0	9	0	0	75	0
Sign Control	Free		Free				Stop			Stop		
Intersection Summary												
Control Type: Unsignalized												
Intersection Capacity Utilization 46.5%						ICU Level of Service A						
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	1264	15	2	819	43	6	1	2	31	0	41
Future Vol, veh/h	30	1264	15	2	819	43	6	1	2	31	0	41
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	4	3	0	0	3	7	0	0	0	0	0	10
Mvmt Flow	31	1317	16	2	853	45	6	1	2	32	0	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	898	0	0	1335	0	0	1820	2291	669	1578	2254	427
Stage 1	-	-	-	-	-	-	1389	1389	-	857	857	-
Stage 2	-	-	-	-	-	-	431	902	-	721	1397	-
Critical Hdwy	4.18	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.24	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.4
Pot Cap-1 Maneuver	*1118	-	-	*878	-	-	*187	*56	*585	*412	*62	*736
Stage 1	-	-	-	-	-	-	*551	*483	-	*715	*626	-
Stage 2	-	-	-	-	-	-	*715	*626	-	*551	*477	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*1118	-	-	*876	-	-	*171	*54	*583	*400	*60	*736
Mov Cap-2 Maneuver	-	-	-	-	-	-	*343	*263	-	*448	*268	-
Stage 1	-	-	-	-	-	-	*535	*468	-	*695	*624	-
Stage 2	-	-	-	-	-	-	*672	*624	-	*533	*462	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	15.2	10.2
HCM LOS			C	B





















Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	364	* 1118	-	-	* 876	-	-	736
HCM Lane V/C Ratio	0.026	0.028	-	-	0.002	-	-	0.058
HCM Control Delay (s)	15.2	8.3	-	-	9.1	-	-	10.2
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.2

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

Lanes, Volumes, Timings
2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 NO BUILD - PM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	1151	42	53	718	76	51	29	54	86	35	98
Future Volume (vph)	138	1151	42	53	718	76	51	29	54	86	35	98
Adj. Flow (vph)	148	1238	45	57	772	82	55	31	58	92	38	105
Lane Group Flow (vph)	148	1283	0	57	772	82	0	144	0	92	143	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		7	4	
Permitted Phases	6			2		2	8			4		
Detector Phase	1	6		5	2	2	8	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	10.0		5.0	10.0	10.0	7.0	7.0		5.0	7.0	
Minimum Split (s)	13.2	27.4		10.3	32.1	32.1	35.5	35.5		11.1	35.5	
Total Split (s)	16.0	94.0		15.0	93.0	93.0	36.0	36.0		15.0	51.0	
Total Split (%)	10.0%	58.8%		9.4%	58.1%	58.1%	22.5%	22.5%		9.4%	31.9%	
Maximum Green (s)	9.8	87.9		9.7	86.9	86.9	29.5	29.5		8.9	44.5	
Yellow Time (s)	3.4	4.6		3.1	4.6	4.6	3.5	3.5		3.1	3.5	
All-Red Time (s)	2.8	1.5		2.2	1.5	1.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.1		5.3	6.1	6.1		6.5		6.1	6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0	3.0	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0	10.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)		10.0			19.0	19.0	22.0	22.0			22.0	
Pedestrian Calls (#/hr)		0			0	0	0	0			0	
Act Effct Green (s)	111.0	102.9		105.1	97.2	97.2		19.4		34.8	34.4	
Actuated g/C Ratio	0.69	0.64		0.66	0.61	0.61		0.12		0.22	0.22	
v/c Ratio	0.32	0.57		0.21	0.36	0.08		0.76		0.41	0.35	
Control Delay	10.2	18.8		8.7	13.6	0.5		82.2		55.8	23.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	10.2	18.8		8.7	13.6	0.5		82.2		55.8	23.1	
LOS	B	B		A	B	A		F		E	C	
Approach Delay		17.9			12.1			82.2			35.9	
Approach LOS		B			B			F			D	
Queue Length 50th (ft)	46	394		13	166	0		129		81	49	
Queue Length 95th (ft)	85	541		m27	199	m3		201		127	109	
Internal Link Dist (ft)		969			335			94			430	
Turn Bay Length (ft)	125			115								
Base Capacity (vph)	476	2245		298	2129	1001		279		228	500	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.31	0.57		0.19	0.36	0.08		0.52		0.40	0.29	
Intersection Summary												

Lanes, Volumes, Timings 2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 NO BUILD - PM

03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 102.9 (64%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 20.9

Intersection LOS: C

Intersection Capacity Utilization 73.8%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 2: Cowan Rd/The Centre Driveway & Hugh Howell Rd























HCM 6th Signalized Intersection Summary

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 NO BUILD - PM

03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	1151	42	53	718	76	51	29	54	86	35	98
Future Volume (veh/h)	138	1151	42	53	718	76	51	29	54	86	35	98
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1856	1900	1856	1870	1900	1900	1900	1885	1900	1900
Adj Flow Rate, veh/h	148	1238	45	57	772	82	55	31	58	92	38	105
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	3	3	0	3	2	0	0	0	1	0	0
Cap, veh/h	540	2270	82	299	2234	1004	88	45	69	255	91	252
Arrive On Green	0.04	0.65	0.65	0.06	1.00	1.00	0.11	0.11	0.11	0.06	0.21	0.21
Sat Flow, veh/h	1810	3470	126	1810	3526	1585	510	403	616	1795	445	1231
Grp Volume(v), veh/h	148	629	654	57	772	82	144	0	0	92	0	143
Grp Sat Flow(s),veh/h/ln	1810	1763	1833	1810	1763	1585	1529	0	0	1795	0	1676
Q Serve(g_s), s	4.6	30.7	30.7	1.8	0.0	0.0	12.8	0.0	0.0	7.1	0.0	11.9
Cycle Q Clear(g_c), s	4.6	30.7	30.7	1.8	0.0	0.0	14.7	0.0	0.0	7.1	0.0	11.9
Prop In Lane	1.00		0.07	1.00		1.00	0.38		0.40	1.00		0.73
Lane Grp Cap(c), veh/h	540	1153	1199	299	2234	1004	201	0	0	255	0	344
V/C Ratio(X)	0.27	0.55	0.55	0.19	0.35	0.08	0.71	0.00	0.00	0.36	0.00	0.42
Avail Cap(c_a), veh/h	572	1153	1199	357	2234	1004	311	0	0	255	0	466
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.1	14.9	14.9	11.7	0.0	0.0	69.6	0.0	0.0	56.8	0.0	55.3
Incr Delay (d2), s/veh	0.3	1.9	1.8	0.3	0.4	0.2	4.7	0.0	0.0	0.9	0.0	0.8
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	1.8	12.2	12.6	0.7	0.1	0.0	6.1	0.0	0.0	3.3	0.0	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.3	16.7	16.7	12.1	0.4	0.2	74.2	0.0	0.0	57.6	0.0	56.1
LnGrp LOS	A	B	B	B	A	A	E	A	A	E	A	E
Approach Vol, veh/h	1431				911				144			
Approach Delay, s/veh	15.9				1.1				74.2			
Approach LOS	B				A				E			
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.2	107.5		39.3	9.9	110.8	15.0	24.3				
Change Period (Y+Rc), s	* 6.2	6.1		6.5	* 5.3	6.1	6.1	6.5				
Max Green Setting (Gmax), s	* 9.8	86.9		44.5	* 9.7	87.9	8.9	29.5				
Max Q Clear Time (g_c+I1), s	6.6	2.0		13.9	3.8	32.7	9.1	16.7				
Green Ext Time (p_c), s	0.1	13.8		0.9	0.0	24.7	0.0	0.6				

Intersection Summary

HCM 6th Ctrl Delay 17.6

HCM 6th LOS B



















Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
3: Tucker Industrial Rd & Hugh Howell Rd

2023 NO BUILD - PM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1030	207	54	679	6	134	1	75	28	10	4
Future Volume (vph)	5	1030	207	54	679	6	134	1	75	28	10	4
Adj. Flow (vph)	5	1084	218	57	715	6	141	1	79	29	11	4
Lane Group Flow (vph)	5	1302	0	57	721	0	0	221	0	0	44	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.1	31.4		10.9	31.4		31.1	31.1		33.9	33.9	
Total Split (s)	15.0	110.0		15.0	110.0		35.0	35.0		35.0	35.0	
Total Split (%)	9.4%	68.8%		9.4%	68.8%		21.9%	21.9%		21.9%	21.9%	
Maximum Green (s)	8.9	103.6		9.1	103.6		28.9	28.9		29.1	29.1	
Yellow Time (s)	3.5	4.7		3.3	4.7		3.3	3.3		3.0	3.0	
All-Red Time (s)	2.6	1.7		2.6	1.7		2.8	2.8		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.4		5.9	6.4			6.1			5.9	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0		0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	15.0		0.0	15.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		18.0	18.0		21.0	21.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effect Green (s)	6.2	109.2		8.7	118.6			26.2			26.4	
Actuated g/C Ratio	0.04	0.68		0.05	0.74			0.16			0.16	
v/c Ratio	0.09	0.56		0.65	0.28			0.89			0.18	
Control Delay	90.8	6.2		104.9	7.8			94.3			54.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	90.8	6.2		104.9	7.8			94.3			54.1	
LOS	F	A		F	A			F			D	
Approach Delay		6.5			14.9			94.3			54.1	
Approach LOS		A			B			F			D	
Queue Length 50th (ft)	5	113		59	117			211			37	
Queue Length 95th (ft)	m11	124		#124	196			#347			76	
Internal Link Dist (ft)		1068			568			739			1148	
Turn Bay Length (ft)	150			100								
Base Capacity (vph)	83	2339		93	2595			273			262	
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	0.06	0.56		0.61	0.28			0.81			0.17	
Intersection Summary												

Lanes, Volumes, Timings

3: Tucker Industrial Rd & Hugh Howell Rd

2023 NO BUILD - PM

03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 118.6 (74%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 18.4

Intersection LOS: B

Intersection Capacity Utilization 68.5%

ICU Level of Service C

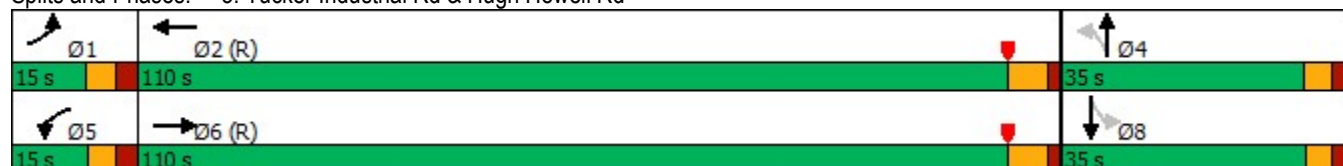
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Tucker Industrial Rd & Hugh Howell Rd































HCM 6th Signalized Intersection Summary

3: Tucker Industrial Rd & Hugh Howell Rd

2023 NO BUILD - PM

03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	1030	207	54	679	6	134	1	75	28	10	4
Future Volume (veh/h)	5	1030	207	54	679	6	134	1	75	28	10	4
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1604	1856	1856	1752	1856	1856	1900	1976	1900	1900	1976	1900
Adj Flow Rate, veh/h	5	1084	218	57	715	6	141	1	79	29	11	4
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, %	20	3	3	10	3	3	0	0	0	0	0	0
Cap, veh/h	10	2023	405	71	2604	22	191	1	86	175	64	20
Arrive On Green	0.01	1.00	1.00	0.04	0.73	0.73	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1527	2926	586	1668	3583	30	1024	7	573	915	423	134
Grp Volume(v), veh/h	5	651	651	57	352	369	221	0	0	44	0	0
Grp Sat Flow(s),veh/h/ln	1527	1763	1749	1668	1763	1850	1604	0	0	1472	0	0
Q Serve(g_s), s	0.5	0.0	0.0	5.4	10.9	10.9	17.7	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.5	0.0	0.0	5.4	10.9	10.9	21.6	0.0	0.0	3.9	0.0	0.0
Prop In Lane	1.00		0.34	1.00		0.02	0.64		0.36	0.66		0.09
Lane Grp Cap(c), veh/h	10	1219	1210	71	1281	1345	279	0	0	259	0	0
V/C Ratio(X)	0.53	0.53	0.54	0.80	0.27	0.27	0.79	0.00	0.00	0.17	0.00	0.00
Avail Cap(c_a), veh/h	85	1219	1210	95	1281	1345	325	0	0	307	0	0
HCM Platoon Ratio	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	78.8	0.0	0.0	75.9	7.5	7.5	66.5	0.0	0.0	59.3	0.0	0.0
Incr Delay (d2), s/veh	38.4	1.7	1.7	28.5	0.5	0.5	11.0	0.0	0.0	0.3	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	0.3	0.6	0.6	2.9	4.0	4.1	9.7	0.0	0.0	1.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	117.2	1.7	1.7	104.4	8.0	8.0	77.6	0.0	0.0	59.6	0.0	0.0
LnGrp LOS	F	A	A	F	A	A	E	A	A	E	A	A
Approach Vol, veh/h	1307			778			221			44		
Approach Delay, s/veh	2.1			15.0			77.6			59.6		
Approach LOS	A			B			E			E		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.1	122.7		30.2	12.7	117.0		30.2				
Change Period (Y+Rc), s	6.1	* 6.4		6.1	* 5.9	* 6.4		* 6.1				
Max Green Setting (Gmax), s	8.9	* 1E2		28.9	* 9.1	* 1E2		* 29				
Max Q Clear Time (g_c+I1), s	2.5	12.9		23.6	7.4	2.0		5.9				
Green Ext Time (p_c), s	0.0	10.4		0.5	0.0	30.9		0.2				
Intersection Summary												
HCM 6th Ctrl Delay	14.6											
HCM 6th LOS	B											
Notes												




















						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations					 	
Traffic Volume (vph)	149	6	27	97	3	31
Future Volume (vph)	149	6	27	97	3	31
Adj. Flow (vph)	162	7	29	105	3	34
Lane Group Flow (vph)	169	0	0	134	37	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 29.0%				ICU Level of Service A		
Analysis Period (min) 15						








Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↕	
Traffic Vol, veh/h	149	6	27	97	3	31
Future Vol, veh/h	149	6	27	97	3	31
Conflicting Peds, #/hr	0	1	1	0	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	25	0	0	0	0
Mvmt Flow	162	7	29	105	3	34
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	170	0	331	169
Stage 1	-	-	-	-	167	-
Stage 2	-	-	-	-	164	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1420	-	668	880
Stage 1	-	-	-	-	867	-
Stage 2	-	-	-	-	870	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1419	-	652	877
Mov Cap-2 Maneuver	-	-	-	-	652	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	850	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.7		9.4	
HCM LOS					A	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	851	-	-	1419	-	
HCM Lane V/C Ratio	0.043	-	-	0.021	-	
HCM Control Delay (s)	9.4	-	-	7.6	-	
HCM Lane LOS	A	-	-	A	-	
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	

2023 BUILD CONDITIONS Capacity Analysis

Lanes, Volumes, Timings
1: Rosser Terrace/Fuller Way & Hugh Howell Rd

2023 BUILD - AM
03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	466	13	60	719	10	3	0	2	19	0	31
Future Volume (vph)	29	466	13	60	719	10	3	0	2	19	0	31
Adj. Flow (vph)	31	501	14	65	773	11	3	0	2	20	0	33
Lane Group Flow (vph)	31	515	0	65	773	11	0	5	0	0	53	0
Sign Control	Free			Free			Stop			Stop		
Intersection Summary												
Control Type: Unsignalized												
Intersection Capacity Utilization 36.5%						ICU Level of Service A						
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	466	13	60	719	10	3	0	2	19	0	31
Future Vol, veh/h	29	466	13	60	719	10	3	0	2	19	0	31
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	7	3	0	0	2	10	33	0	0	10	0	0
Mvmt Flow	31	501	14	65	773	11	3	0	2	20	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	785	0	0	516	0	0	1088	1486	259	1217	1482	388
Stage 1	-	-	-	-	-	-	571	571	-	904	904	-
Stage 2	-	-	-	-	-	-	517	915	-	313	578	-
Critical Hdwy	4.24	-	-	4.1	-	-	8.16	6.5	6.9	7.7	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	7.16	5.5	-	6.7	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.16	5.5	-	6.7	5.5	-
Follow-up Hdwy	2.27	-	-	2.2	-	-	3.83	4	3.3	3.6	4	3.3
Pot Cap-1 Maneuver	*1159	-	-	1332	-	-	*533	333	*912	*568	337	*796
Stage 1	-	-	-	-	-	-	*681	684	-	*609	577	-
Stage 2	-	-	-	-	-	-	*687	569	-	*837	678	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*1158	-	-	1331	-	-	*482	308	*911	*534	311	*796
Mov Cap-2 Maneuver	-	-	-	-	-	-	*503	399	-	*529	402	-
Stage 1	-	-	-	-	-	-	*662	665	-	*592	548	-
Stage 2	-	-	-	-	-	-	*626	541	-	*812	659	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.6			10.9			9.7		
HCM LOS							B			A		





















Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	613	* 1158	-	-	1331	-	-	796
HCM Lane V/C Ratio	0.009	0.027	-	-	0.048	-	-	0.042
HCM Control Delay (s)	10.9	8.2	-	-	7.8	-	-	9.7
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0.2	-	-	0.1

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

Lanes, Volumes, Timings
2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD - AM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	407	45	20	710	34	70	7	82	21	5	32
Future Volume (vph)	46	407	45	20	710	34	70	7	82	21	5	32
Adj. Flow (vph)	49	438	48	22	763	37	75	8	88	23	5	34
Lane Group Flow (vph)	49	486	0	22	763	37	0	171	0	23	39	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		7	4	
Permitted Phases	6			2		2	8			4		
Detector Phase	1	6		5	2	2	8	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	10.0		5.0	10.0	10.0	7.0	7.0		5.0	7.0	
Minimum Split (s)	13.2	27.4		10.3	32.1	32.1	35.5	35.5		11.1	35.5	
Total Split (s)	26.0	85.0		17.0	76.0	76.0	42.0	42.0		16.0	58.0	
Total Split (%)	16.3%	53.1%		10.6%	47.5%	47.5%	26.3%	26.3%		10.0%	36.3%	
Maximum Green (s)	19.8	78.9		11.7	69.9	69.9	35.5	35.5		9.9	51.5	
Yellow Time (s)	3.4	4.6		3.1	4.6	4.6	3.5	3.5		3.1	3.5	
All-Red Time (s)	2.8	1.5		2.2	1.5	1.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.1		5.3	6.1	6.1		6.5		6.1	6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0	3.0	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0	10.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)		10.0			19.0	19.0	22.0	22.0			22.0	
Pedestrian Calls (#/hr)		0			0	0	0	0			0	
Act Effct Green (s)	115.1	110.6		112.6	106.7	106.7		20.7		30.1	29.7	
Actuated g/C Ratio	0.72	0.69		0.70	0.67	0.67		0.13		0.19	0.19	
v/c Ratio	0.10	0.21		0.03	0.33	0.03		0.78		0.12	0.12	
Control Delay	8.8	11.5		8.1	12.5	0.1		77.7		48.1	16.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	8.8	11.5		8.1	12.5	0.1		77.7		48.1	16.4	
LOS	A	B		A	B	A		E		D	B	
Approach Delay		11.3			11.8			77.7			28.1	
Approach LOS		B			B			E			C	
Queue Length 50th (ft)	14	106		5	173	0		145		19	4	
Queue Length 95th (ft)	36	165		17	232	0		221		42	35	
Internal Link Dist (ft)		969			335			119			430	
Turn Bay Length (ft)	125			115								
Base Capacity (vph)	591	2330		723	2315	1100		353		195	519	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.08	0.21		0.03	0.33	0.03		0.48		0.12	0.08	
Intersection Summary												

Lanes, Volumes, Timings

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD - AM

03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 148.9 (93%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 19.4

Intersection LOS: B

Intersection Capacity Utilization 59.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: Cowan Rd/The Centre Driveway & Hugh Howell Rd























HCM 6th Signalized Intersection Summary

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD - AM

03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	407	45	20	710	34	70	7	82	21	5	32
Future Volume (veh/h)	46	407	45	20	710	34	70	7	82	21	5	32
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1826	1826	1900	1841	1900	1900	1900	1900	1752	1900	1900
Adj Flow Rate, veh/h	49	438	48	22	763	37	75	8	88	23	5	34
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	5	5	0	4	0	0	0	0	10	0	0
Cap, veh/h	570	2155	235	664	2302	1059	112	15	100	198	39	265
Arrive On Green	0.04	0.68	0.68	0.04	1.00	1.00	0.13	0.13	0.13	0.02	0.19	0.19
Sat Flow, veh/h	1810	3154	344	1810	3497	1609	624	119	787	1668	211	1432
Grp Volume(v), veh/h	49	240	246	22	763	37	171	0	0	23	0	39
Grp Sat Flow(s),veh/h/ln	1810	1735	1764	1810	1749	1609	1530	0	0	1668	0	1642
Q Serve(g_s), s	1.3	8.1	8.2	0.6	0.0	0.0	16.3	0.0	0.0	1.9	0.0	3.2
Cycle Q Clear(g_c), s	1.3	8.1	8.2	0.6	0.0	0.0	17.5	0.0	0.0	1.9	0.0	3.2
Prop In Lane	1.00		0.20	1.00		1.00	0.44		0.51	1.00		0.87
Lane Grp Cap(c), veh/h	570	1185	1205	664	2302	1059	227	0	0	198	0	304
V/C Ratio(X)	0.09	0.20	0.20	0.03	0.33	0.03	0.75	0.00	0.00	0.12	0.00	0.13
Avail Cap(c_a), veh/h	723	1185	1205	761	2302	1059	370	0	0	268	0	529
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.5	9.3	9.3	8.3	0.0	0.0	68.5	0.0	0.0	57.3	0.0	54.4
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.0	0.4	0.1	5.0	0.0	0.0	0.3	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	0.5	3.0	3.1	0.2	0.1	0.0	7.2	0.0	0.0	0.8	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.6	9.7	9.7	8.3	0.4	0.1	73.5	0.0	0.0	57.5	0.0	54.6
LnGrp LOS	A	A	A	A	A	A	E	A	A	E	A	D
Approach Vol, veh/h	535			822			171			62		
Approach Delay, s/veh	9.5			0.6			73.5			55.7		
Approach LOS	A			A			E			E		
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.4	111.4		36.2	8.4	115.4	9.3	26.9				
Change Period (Y+Rc), s	* 6.2	6.1		6.5	* 5.3	6.1	6.1	6.5				
Max Green Setting (Gmax), s	* 20	69.9		51.5	* 12	78.9	9.9	35.5				
Max Q Clear Time (g_c+I1), s	3.3	2.0		5.2	2.6	10.2	3.9	19.5				
Green Ext Time (p_c), s	0.1	12.8		0.2	0.0	6.2	0.0	0.8				

Intersection Summary

HCM 6th Ctrl Delay 13.6

HCM 6th LOS B



















Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
3: Tucker Industrial Rd & Hugh Howell Rd

2023 BUILD - AM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	374	58	34	706	23	78	6	25	6	2	12
Future Volume (vph)	8	374	58	34	706	23	78	6	25	6	2	12
Adj. Flow (vph)	9	416	64	38	784	26	87	7	28	7	2	13
Lane Group Flow (vph)	9	480	0	38	810	0	0	122	0	0	22	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.1	31.4		10.9	31.4		31.1	31.1		33.9	33.9	
Total Split (s)	15.0	89.0		15.0	89.0		56.0	56.0		56.0	56.0	
Total Split (%)	9.4%	55.6%		9.4%	55.6%		35.0%	35.0%		35.0%	35.0%	
Maximum Green (s)	8.9	82.6		9.1	82.6		49.9	49.9		50.1	50.1	
Yellow Time (s)	3.5	4.7		3.3	4.7		3.3	3.3		3.0	3.0	
All-Red Time (s)	2.6	1.7		2.6	1.7		2.8	2.8		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.4		5.9	6.4			6.1			5.9	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0		0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	15.0		0.0	15.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		18.0	18.0		21.0	21.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effect Green (s)	6.4	116.2		9.1	126.2			18.5			18.7	
Actuated g/C Ratio	0.04	0.73		0.06	0.79			0.12			0.12	
v/c Ratio	0.13	0.20		0.42	0.30			0.73			0.10	
Control Delay	98.6	9.8		85.4	5.9			85.2			35.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	98.6	9.8		85.4	5.9			85.2			35.0	
LOS	F	A		F	A			F			D	
Approach Delay		11.5			9.5			85.2			35.0	
Approach LOS		B			A			F			D	
Queue Length 50th (ft)	8	127		39	95			115			9	
Queue Length 95th (ft)	m28	199		79	216			181			36	
Internal Link Dist (ft)		1068			568			739			1148	
Turn Bay Length (ft)	150			100								
Base Capacity (vph)	100	2447		101	2743			437			543	
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	0.09	0.20		0.38	0.30			0.28			0.04	
Intersection Summary												

Lanes, Volumes, Timings

3: Tucker Industrial Rd & Hugh Howell Rd

2023 BUILD - AM
03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 38.6 (24%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 16.8

Intersection LOS: B

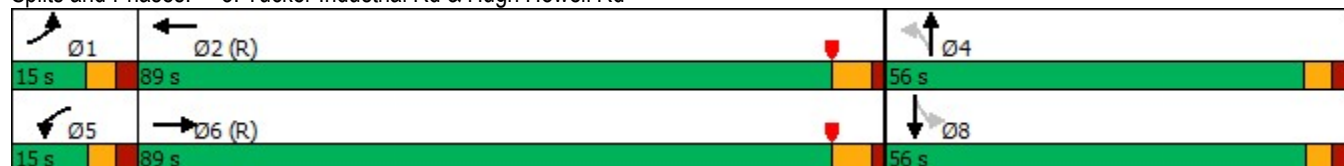
Intersection Capacity Utilization 51.8%

ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 3: Tucker Industrial Rd & Hugh Howell Rd






























HCM 6th Signalized Intersection Summary




3: Tucker Industrial Rd & Hugh Howell Rd























2023 BUILD - AM








03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	374	58	34	706	23	78	6	25	6	2	12
Future Volume (veh/h)	8	374	58	34	706	23	78	6	25	6	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		0.98	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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1826	1826	1722	1856	1856	1900	1976	1900	1900	1976	1900
Adj Flow Rate, veh/h	9	416	64	38	784	26	87	7	28	7	2	13
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	5	5	12	3	3	0	0	0	0	0	0
Cap, veh/h	19	2290	350	48	2712	90	145	9	34	68	29	98
Arrive On Green	0.02	1.00	1.00	0.03	0.78	0.78	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	1810	3007	459	1640	3482	115	1126	93	363	406	311	1037
Grp Volume(v), veh/h	9	239	241	38	397	413	122	0	0	22	0	0
Grp Sat Flow(s),veh/h/ln	1810	1735	1732	1640	1763	1835	1581	0	0	1755	0	0
Q Serve(g_s), s	0.8	0.0	0.0	3.7	10.3	10.3	10.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.8	0.0	0.0	3.7	10.3	10.3	12.0	0.0	0.0	1.8	0.0	0.0
Prop In Lane	1.00		0.27	1.00		0.06	0.71		0.23	0.32		0.59
Lane Grp Cap(c), veh/h	19	1321	1318	48	1373	1429	188	0	0	196	0	0
V/C Ratio(X)	0.48	0.18	0.18	0.80	0.29	0.29	0.65	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	101	1321	1318	93	1373	1429	522	0	0	548	0	0
HCM Platoon Ratio	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	77.9	0.0	0.0	77.2	5.0	5.0	70.9	0.0	0.0	66.4	0.0	0.0
Incr Delay (d2), s/veh	18.1	0.3	0.3	25.3	0.5	0.5	3.7	0.0	0.0	0.3	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	0.1	0.1	1.9	3.4	3.5	5.1	0.0	0.0	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	96.0	0.3	0.3	102.5	5.6	5.6	74.6	0.0	0.0	66.7	0.0	0.0
LnGrp LOS	F	A	A	F	A	A	E	A	A	E	A	A
Approach Vol, veh/h	489		848				122		22			
Approach Delay, s/veh	2.1		9.9				74.6		66.7			
Approach LOS	A		A				E		E			
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.7	131.0		21.2	10.5	128.2		21.2				
Change Period (Y+Rc), s	6.1	* 6.4		6.1	* 5.9	* 6.4		* 6.1				
Max Green Setting (Gmax), s	8.9	* 83		49.9	* 9.1	* 83		* 50				
Max Q Clear Time (g_c+I1), s	2.8	12.3		14.0	5.7	2.0		3.8				
Green Ext Time (p_c), s	0.0	12.3		0.7	0.0	6.2		0.1				
Intersection Summary												
HCM 6th Ctrl Delay	13.5											
HCM 6th LOS	B											
Notes												

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	50	29	40	48	30	117
Future Volume (vph)	50	29	40	48	30	117
Adj. Flow (vph)	68	39	54	65	41	158
Lane Group Flow (vph)	107	0	0	119	199	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 26.9%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	5.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	50	29	40	48	30	117
Future Vol, veh/h	50	29	40	48	30	117
Conflicting Peds, #/hr	0	0	0	0	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	4	50	0	8	0	0
Mvmt Flow	68	39	54	65	41	158
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	107	0	262	88
Stage 1	-	-	-	-	88	-
Stage 2	-	-	-	-	174	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1497	-	731	976
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	861	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1497	-	703	976
Mov Cap-2 Maneuver	-	-	-	-	703	-
Stage 1	-	-	-	-	940	-
Stage 2	-	-	-	-	828	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		3.4		10.1	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	904	-	-	1497	-	
HCM Lane V/C Ratio	0.22	-	-	0.036	-	
HCM Control Delay (s)	10.1	-	-	7.5	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-	





















												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Traffic Volume (vph)	30	1290	29	69	782	43	6	1	2	31	0	41
Future Volume (vph)	30	1290	29	69	782	43	6	1	2	31	0	41
Adj. Flow (vph)	31	1344	30	72	815	45	6	1	2	32	0	43
Lane Group Flow (vph)	31	1374	0	72	815	45	0	9	0	0	75	0
Sign Control	Free				Free		Stop				Stop	
Intersection Summary												
Control Type: Unsignalized												
Intersection Capacity Utilization 54.8%												
ICU Level of Service A												
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	1290	29	69	782	43	6	1	2	31	0	41
Future Vol, veh/h	30	1290	29	69	782	43	6	1	2	31	0	41
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	4	3	0	0	3	7	0	0	0	0	0	10
Mvmt Flow	31	1344	30	72	815	45	6	1	2	32	0	43
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	860	0	0	1376	0	0	1975	2427	689	1694	2397	408
Stage 1	-	-	-	-	-	-	1423	1423	-	959	959	-
Stage 2	-	-	-	-	-	-	552	1004	-	735	1438	-
Critical Hdwy	4.18	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.24	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.4
Pot Cap-1 Maneuver	1145	-	-	*849	-	-	*102	*37	*565	*252	*40	*754
Stage 1	-	-	-	-	-	-	*533	*467	-	*609	*560	-
Stage 2	-	-	-	-	-	-	*733	*526	-	*533	*467	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	1145	-	-	*847	-	-	*88	*33	*564	*229	*36	*754
Mov Cap-2 Maneuver	-	-	-	-	-	-	*294	*221	-	*332	*216	-
Stage 1	-	-	-	-	-	-	*518	*453	-	*593	*513	-
Stage 2	-	-	-	-	-	-	*633	*481	-	*516	*453	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.7			16.7			10.1		
HCM LOS							C			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	316	1145	-	-	* 847	-	-	754				
HCM Lane V/C Ratio	0.03	0.027	-	-	0.085	-	-	0.057				
HCM Control Delay (s)	16.7	8.2	-	-	9.6	-	-	10.1				
HCM Lane LOS	C	A	-	-	A	-	-	B				
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.3	-	-	0.2				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s				+: Computation Not Defined				*: All major volume in platoon		

Lanes, Volumes, Timings
2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD - PM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	1136	76	53	681	76	103	29	109	86	35	98
Future Volume (vph)	138	1136	76	53	681	76	103	29	109	86	35	98
Adj. Flow (vph)	148	1222	82	57	732	82	111	31	117	92	38	105
Lane Group Flow (vph)	148	1304	0	57	732	82	0	259	0	92	143	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		7	4	
Permitted Phases	6			2		2	8			4		
Detector Phase	1	6		5	2	2	8	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	10.0		5.0	10.0	10.0	7.0	7.0		5.0	7.0	
Minimum Split (s)	13.2	27.4		10.3	32.1	32.1	35.5	35.5		11.1	35.5	
Total Split (s)	16.0	94.0		15.0	93.0	93.0	36.0	36.0		15.0	51.0	
Total Split (%)	10.0%	58.8%		9.4%	58.1%	58.1%	22.5%	22.5%		9.4%	31.9%	
Maximum Green (s)	9.8	87.9		9.7	86.9	86.9	29.5	29.5		8.9	44.5	
Yellow Time (s)	3.4	4.6		3.1	4.6	4.6	3.5	3.5		3.1	3.5	
All-Red Time (s)	2.8	1.5		2.2	1.5	1.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.1		5.3	6.1	6.1		6.5		6.1	6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0	3.0	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0	10.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)		10.0			19.0	19.0	22.0	22.0			22.0	
Pedestrian Calls (#/hr)		0			0	0	0	0			0	
Act Effct Green (s)	100.8	93.1		96.1	87.9	87.9		29.0		44.3	43.9	
Actuated g/C Ratio	0.63	0.58		0.60	0.55	0.55		0.18		0.28	0.27	
v/c Ratio	0.34	0.64		0.25	0.38	0.09		0.96		0.33	0.29	
Control Delay	13.4	24.9		11.5	17.5	0.6		103.8		47.8	20.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	13.4	24.9		11.5	17.5	0.6		103.8		47.8	20.2	
LOS	B	C		B	B	A		F		D	C	
Approach Delay		23.7			15.5			103.8			31.0	
Approach LOS		C			B			F			C	
Queue Length 50th (ft)	57	482		16	162	0		250		74	45	
Queue Length 95th (ft)	89	574		m28	190	m3		#436		125	107	
Internal Link Dist (ft)		969			335			94			430	
Turn Bay Length (ft)	125			115								
Base Capacity (vph)	437	2027		251	1926	916		274		277	500	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.34	0.64		0.23	0.38	0.09		0.95		0.33	0.29	
Intersection Summary												

Lanes, Volumes, Timings

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD - PM

03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 102.9 (64%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 29.1

Intersection LOS: C

Intersection Capacity Utilization 80.5%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 2: Cowan Rd/The Centre Driveway & Hugh Howell Rd























HCM 6th Signalized Intersection Summary

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD - PM

03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	1136	76	53	681	76	103	29	109	86	35	98
Future Volume (veh/h)	138	1136	76	53	681	76	103	29	109	86	35	98
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1856	1900	1856	1870	1900	1900	1900	1885	1900	1900
Adj Flow Rate, veh/h	148	1222	82	57	732	82	111	31	117	92	38	105
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	3	3	0	3	2	0	0	0	1	0	0
Cap, veh/h	513	1960	131	245	1974	888	145	36	123	304	122	338
Arrive On Green	0.05	0.58	0.58	0.06	1.00	1.00	0.18	0.18	0.18	0.05	0.27	0.27
Sat Flow, veh/h	1810	3353	225	1810	3526	1585	610	197	665	1795	446	1231
Grp Volume(v), veh/h	148	642	662	57	732	82	259	0	0	92	0	143
Grp Sat Flow(s),veh/h/ln	1810	1763	1815	1810	1763	1585	1472	0	0	1795	0	1677
Q Serve(g_s), s	5.6	38.0	38.2	2.1	0.0	0.0	27.0	0.0	0.0	6.5	0.0	10.8
Cycle Q Clear(g_c), s	5.6	38.0	38.2	2.1	0.0	0.0	27.9	0.0	0.0	6.5	0.0	10.8
Prop In Lane	1.00		0.12	1.00		1.00	0.43		0.45	1.00		0.73
Lane Grp Cap(c), veh/h	513	1031	1061	245	1974	888	304	0	0	304	0	461
V/C Ratio(X)	0.29	0.62	0.62	0.23	0.37	0.09	0.85	0.00	0.00	0.30	0.00	0.31
Avail Cap(c_a), veh/h	537	1031	1061	303	1974	888	304	0	0	310	0	466
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.4	21.7	21.7	17.6	0.0	0.0	64.5	0.0	0.0	47.5	0.0	46.0
Incr Delay (d2), s/veh	0.3	2.8	2.8	0.5	0.5	0.2	20.3	0.0	0.0	0.6	0.0	0.4
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	2.3	15.9	16.3	0.9	0.1	0.1	12.2	0.0	0.0	3.0	0.0	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.7	24.5	24.5	18.1	0.5	0.2	84.8	0.0	0.0	48.1	0.0	46.4
LnGrp LOS	B	C	C	B	A	A	F	A	A	D	A	D
Approach Vol, veh/h	1452				871				259			
Approach Delay, s/veh	23.4				1.7				84.8			
Approach LOS	C				A				F			
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.9	95.7		50.5	9.9	99.6	14.5	36.0				
Change Period (Y+Rc), s	* 6.2	6.1		6.5	* 5.3	6.1	6.1	6.5				
Max Green Setting (Gmax), s	* 9.8	86.9		44.5	* 9.7	87.9	8.9	29.5				
Max Q Clear Time (g_c+I1), s	7.6	2.0		12.8	4.1	40.2	8.5	29.9				
Green Ext Time (p_c), s	0.1	12.8		0.9	0.0	23.8	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay 24.3

HCM 6th LOS C



















Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings
3: Tucker Industrial Rd & Hugh Howell Rd

2023 BUILD - PM

03/09/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	1049	211	54	701	6	138	1	75	28	10	8
Future Volume (vph)	8	1049	211	54	701	6	138	1	75	28	10	8
Adj. Flow (vph)	8	1104	222	57	738	6	145	1	79	29	11	8
Lane Group Flow (vph)	8	1326	0	57	744	0	0	225	0	0	48	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	11.1	31.4		10.9	31.4		31.1	31.1		33.9	33.9	
Total Split (s)	15.0	110.0		15.0	110.0		35.0	35.0		35.0	35.0	
Total Split (%)	9.4%	68.8%		9.4%	68.8%		21.9%	21.9%		21.9%	21.9%	
Maximum Green (s)	8.9	103.6		9.1	103.6		28.9	28.9		29.1	29.1	
Yellow Time (s)	3.5	4.7		3.3	4.7		3.3	3.3		3.0	3.0	
All-Red Time (s)	2.6	1.7		2.6	1.7		2.8	2.8		2.9	2.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	6.1	6.4		5.9	6.4			6.1			5.9	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0		0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	15.0		0.0	15.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		18.0	18.0		21.0	21.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effect Green (s)	6.5	109.0		8.7	118.2			26.5			26.7	
Actuated g/C Ratio	0.04	0.68		0.05	0.74			0.17			0.17	
v/c Ratio	0.13	0.57		0.65	0.29			0.90			0.19	
Control Delay	89.2	6.5		104.9	8.0			95.4			51.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	89.2	6.5		104.9	8.0			95.4			51.0	
LOS	F	A		F	A			F			D	
Approach Delay		7.0			14.9			95.4			51.0	
Approach LOS		A			B			F			D	
Queue Length 50th (ft)	9	142		59	122			215			38	
Queue Length 95th (ft)	m15	m155		#124	206			#359			79	
Internal Link Dist (ft)		1068			568			739			1148	
Turn Bay Length (ft)	150			100								
Base Capacity (vph)	83	2334		93	2587			273			269	
Starvation Cap Reductn	0	0		0	0			0			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.10	0.57		0.61	0.29			0.82			0.18	
Intersection Summary												

Lanes, Volumes, Timings

3: Tucker Industrial Rd & Hugh Howell Rd

2023 BUILD - PM

03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 118.6 (74%), Referenced to phase 2:WBT and 6:EBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 18.8

Intersection LOS: B

Intersection Capacity Utilization 70.3%

ICU Level of Service C

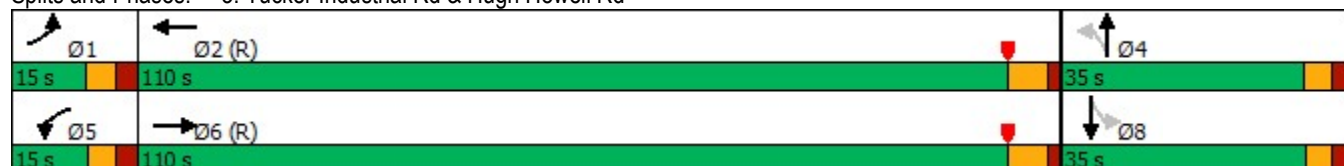
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Tucker Industrial Rd & Hugh Howell Rd































HCM 6th Signalized Intersection Summary

3: Tucker Industrial Rd & Hugh Howell Rd

2023 BUILD - PM
























03/09/2022









												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1049	211	54	701	6	138	1	75	28	10	8
Future Volume (veh/h)	8	1049	211	54	701	6	138	1	75	28	10	8
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1604	1856	1856	1752	1856	1856	1900	1976	1900	1900	1976	1900
Adj Flow Rate, veh/h	8	1104	222	57	738	6	145	1	79	29	11	8
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, %	20	3	3	10	3	3	0	0	0	0	0	0
Cap, veh/h	14	2015	403	71	2583	21	195	1	86	167	63	39
Arrive On Green	0.02	1.00	1.00	0.04	0.72	0.72	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1527	2926	586	1668	3584	29	1028	7	560	853	409	252
Grp Volume(v), veh/h	8	663	663	57	363	381	225	0	0	48	0	0
Grp Sat Flow(s),veh/h/ln	1527	1763	1749	1668	1763	1850	1596	0	0	1513	0	0
Q Serve(g_s), s	0.8	0.0	0.0	5.4	11.6	11.6	18.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.8	0.0	0.0	5.4	11.6	11.6	22.1	0.0	0.0	4.1	0.0	0.0
Prop In Lane	1.00		0.33	1.00		0.02	0.64		0.35	0.60		0.17
Lane Grp Cap(c), veh/h	14	1214	1204	71	1270	1333	282	0	0	269	0	0
V/C Ratio(X)	0.56	0.55	0.55	0.80	0.29	0.29	0.80	0.00	0.00	0.18	0.00	0.00
Avail Cap(c_a), veh/h	85	1214	1204	95	1270	1333	324	0	0	312	0	0
HCM Platoon Ratio	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	78.2	0.0	0.0	75.9	7.9	7.9	66.3	0.0	0.0	58.9	0.0	0.0
Incr Delay (d2), s/veh	30.1	1.8	1.8	28.5	0.6	0.5	11.6	0.0	0.0	0.3	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	0.6	0.6	2.9	4.2	4.4	9.9	0.0	0.0	1.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	108.3	1.8	1.8	104.4	8.4	8.4	77.9	0.0	0.0	59.2	0.0	0.0
LnGrp LOS	F	A	A	F	A	A	E	A	A	E	A	A
Approach Vol, veh/h	1334			801			225			48		
Approach Delay, s/veh	2.4			15.3			77.9			59.2		
Approach LOS	A			B			E			E		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.6	121.7		30.7	12.7	116.6		30.7				
Change Period (Y+Rc), s	6.1	* 6.4		6.1	* 5.9	* 6.4		* 6.1				
Max Green Setting (Gmax), s	8.9	* 1E2		28.9	* 9.1	* 1E2		* 29				
Max Q Clear Time (g_c+I1), s	2.8	13.6		24.1	7.4	2.0		6.1				
Green Ext Time (p_c), s	0.0	10.9		0.5	0.0	32.2		0.2				
Intersection Summary												
HCM 6th Ctrl Delay	14.9											
HCM 6th LOS	B											
Notes												

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations					 	
Traffic Volume (vph)	145	35	65	93	30	141
Future Volume (vph)	145	35	65	93	30	141
Adj. Flow (vph)	158	38	71	101	33	153
Lane Group Flow (vph)	196	0	0	172	186	0
Sign Control	Free			Free	Stop	
Intersection Summary						
Control Type: Unsignalized						
Intersection Capacity Utilization 39.1%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	4.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↕	
Traffic Vol, veh/h	145	35	65	93	30	141
Future Vol, veh/h	145	35	65	93	30	141
Conflicting Peds, #/hr	0	1	1	0	1	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	25	0	0	0	0
Mvmt Flow	158	38	71	101	33	153
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	197	0	422	180
Stage 1	-	-	-	-	178	-
Stage 2	-	-	-	-	244	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1388	-	592	868
Stage 1	-	-	-	-	858	-
Stage 2	-	-	-	-	801	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1387	-	559	866
Mov Cap-2 Maneuver	-	-	-	-	559	-
Stage 1	-	-	-	-	857	-
Stage 2	-	-	-	-	757	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		3.2		11	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	790	-	-	1387	-	
HCM Lane V/C Ratio	0.235	-	-	0.051	-	
HCM Control Delay (s)	11	-	-	7.7	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.9	-	-	0.2	-	

2023 BUILD IMPROVED CONDITIONS
Capacity Analysis

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Traffic Volume (vph)	29	466	13	60	719	10	3	0	2	19	0	31
Future Volume (vph)	29	466	13	60	719	10	3	0	2	19	0	31
Adj. Flow (vph)	31	501	14	65	773	11	3	0	2	20	0	33
Lane Group Flow (vph)	31	501	14	65	773	11	0	5	0	0	53	0
Sign Control	Free			Free			Stop			Stop		
Intersection Summary												
Control Type: Unsignalized												
Intersection Capacity Utilization 36.5%						ICU Level of Service A						
Analysis Period (min) 15												





















Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	29	466	13	60	719	10	3	0	2	19	0	31
Future Vol, veh/h	29	466	13	60	719	10	3	0	2	19	0	31
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	100	100	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	7	3	0	0	2	10	33	0	0	10	0	0
Mvmt Flow	31	501	14	65	773	11	3	0	2	20	0	33









Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	785	0	0	516	0	0	1081	1479	252	1217	1482	388
Stage 1	-	-	-	-	-	-	564	564	-	904	904	-
Stage 2	-	-	-	-	-	-	517	915	-	313	578	-
Critical Hdwy	4.24	-	-	4.1	-	-	8.16	6.5	6.9	7.7	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	7.16	5.5	-	6.7	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	7.16	5.5	-	6.7	5.5	-
Follow-up Hdwy	2.27	-	-	2.2	-	-	3.83	4	3.3	3.6	4	3.3
Pot Cap-1 Maneuver	*1159	-	-	1332	-	-	*533	339	*912	*568	337	*796
Stage 1	-	-	-	-	-	-	*689	689	-	*609	577	-
Stage 2	-	-	-	-	-	-	*687	569	-	*837	678	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	*1158	-	-	1331	-	-	*482	313	*911	*534	311	*796
Mov Cap-2 Maneuver	-	-	-	-	-	-	*504	402	-	*529	402	-
Stage 1	-	-	-	-	-	-	*670	670	-	*592	548	-
Stage 2	-	-	-	-	-	-	*626	541	-	*812	659	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.5			0.6			10.9			9.7		
HCM LOS							B			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	614	* 1158	-	-	1331	-	-	796
HCM Lane V/C Ratio	0.009	0.027	-	-	0.048	-	-	0.042
HCM Control Delay (s)	10.9	8.2	-	-	7.8	-	-	9.7
HCM Lane LOS	B	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0	0.1	-	-	0.2	-	-	0.1

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

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1290	29	69	782	43	6	1	2	31	0	41
Future Volume (vph)	30	1290	29	69	782	43	6	1	2	31	0	41
Adj. Flow (vph)	31	1344	30	72	815	45	6	1	2	32	0	43
Lane Group Flow (vph)	31	1344	30	72	815	45	0	9	0	0	75	0
Sign Control	Free			Free			Stop			Stop		
Intersection Summary												
Control Type: Unsignalized												
Intersection Capacity Utilization 53.9%						ICU Level of Service A						
Analysis Period (min) 15												





















Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	1290	29	69	782	43	6	1	2	31	0	41
Future Vol, veh/h	30	1290	29	69	782	43	6	1	2	31	0	41
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	100	100	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	4	3	0	0	3	7	0	0	0	0	0	10
Mvmt Flow	31	1344	30	72	815	45	6	1	2	32	0	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	860	0	0	1376	0	0	1960	2412	674	1694	2397	408
Stage 1	-	-	-	-	-	-	1408	1408	-	959	959	-
Stage 2	-	-	-	-	-	-	552	1004	-	735	1438	-
Critical Hdwy	4.18	-	-	4.1	-	-	7.5	6.5	6.9	7.5	6.5	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.24	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.4
Pot Cap-1 Maneuver	1145	-	-	*849	-	-	*107	*39	*565	*252	*40	*754
Stage 1	-	-	-	-	-	-	*533	*467	-	*609	*560	-
Stage 2	-	-	-	-	-	-	*733	*526	-	*533	*467	-
Platoon blocked, %	1	-	-	1	-	-	1	1	1	1	1	1
Mov Cap-1 Maneuver	1145	-	-	*847	-	-	*93	*34	*564	*229	*36	*754
Mov Cap-2 Maneuver	-	-	-	-	-	-	*296	*222	-	*332	*216	-
Stage 1	-	-	-	-	-	-	*518	*453	-	*593	*513	-
Stage 2	-	-	-	-	-	-	*633	*481	-	*516	*453	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.7			16.7			10.1		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	318	1145	-	-	* 847	-	-	754
HCM Lane V/C Ratio	0.029	0.027	-	-	0.085	-	-	0.057
HCM Control Delay (s)	16.7	8.2	-	-	9.6	-	-	10.1
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.3	-	-	0.2

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

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	1136	76	53	681	76	103	29	109	86	35	98
Future Volume (vph)	138	1136	76	53	681	76	103	29	109	86	35	98
Adj. Flow (vph)	148	1222	82	57	732	82	111	31	117	92	38	105
Lane Group Flow (vph)	148	1304	0	57	732	82	0	259	0	92	143	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		pm+pt	NA	
Protected Phases	1	6		5	2			8		7	4	
Permitted Phases	6			2		2	8			4		
Detector Phase	1	6		5	2	2	8	8		7	4	
Switch Phase												
Minimum Initial (s)	7.0	10.0		5.0	10.0	10.0	7.0	7.0		5.0	7.0	
Minimum Split (s)	13.2	27.4		10.3	32.1	32.1	35.5	35.5		11.1	35.5	
Total Split (s)	16.0	87.0		15.0	86.0	86.0	46.0	46.0		12.0	58.0	
Total Split (%)	10.0%	54.4%		9.4%	53.8%	53.8%	28.8%	28.8%		7.5%	36.3%	
Maximum Green (s)	9.8	80.9		9.7	79.9	79.9	39.5	39.5		5.9	51.5	
Yellow Time (s)	3.4	4.6		3.1	4.6	4.6	3.5	3.5		3.1	3.5	
All-Red Time (s)	2.8	1.5		2.2	1.5	1.5	3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.2	6.1		5.3	6.1	6.1		6.5		6.1	6.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes		
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.0		0.2	3.0	3.0	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0	10.0	0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)		10.0			19.0	19.0	22.0	22.0			22.0	
Pedestrian Calls (#/hr)		0			0	0	0	0			0	
Act Effct Green (s)	101.3	93.1		95.8	87.6	87.6		31.8		44.2	43.8	
Actuated g/C Ratio	0.63	0.58		0.60	0.55	0.55		0.20		0.28	0.27	
v/c Ratio	0.34	0.64		0.25	0.38	0.09		0.88		0.35	0.29	
Control Delay	14.2	26.0		12.5	18.2	0.6		84.3		46.6	17.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	14.2	26.0		12.5	18.2	0.6		84.3		46.6	17.4	
LOS	B	C		B	B	A		F		D	B	
Approach Delay		24.8			16.2			84.3			28.8	
Approach LOS		C			B			F			C	
Queue Length 50th (ft)	58	485		16	170	0		241		74	40	
Queue Length 95th (ft)	101	640		m33	192	m3		340		117	94	
Internal Link Dist (ft)		969			335			94			430	
Turn Bay Length (ft)	125			115								
Base Capacity (vph)	441	2027		251	1918	912		360		266	570	
Starvation Cap Reductn	0	0		0	0	0		0		0	0	
Spillback Cap Reductn	0	0		0	0	0		0		0	0	
Storage Cap Reductn	0	0		0	0	0		0		0	0	
Reduced v/c Ratio	0.34	0.64		0.23	0.38	0.09		0.72		0.35	0.25	
Intersection Summary												

Lanes, Volumes, Timings 2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD IMPROVED - PM

03/09/2022

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 102.9 (64%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 27.9

Intersection LOS: C

Intersection Capacity Utilization 80.5%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 2: Cowan Rd/The Centre Driveway & Hugh Howell Rd























HCM 6th Signalized Intersection Summary

2: Cowan Rd/The Centre Driveway & Hugh Howell Rd

2023 BUILD IMPROVED - PM

03/09/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	1136	76	53	681	76	103	29	109	86	35	98
Future Volume (veh/h)	138	1136	76	53	681	76	103	29	109	86	35	98
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
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1856	1856	1900	1856	1870	1900	1900	1900	1885	1900	1900
Adj Flow Rate, veh/h	148	1222	82	57	732	82	111	31	117	92	38	105
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	3	3	0	3	2	0	0	0	1	0	0
Cap, veh/h	518	1987	133	251	2005	901	149	38	128	286	119	328
Arrive On Green	0.05	0.59	0.59	0.06	1.00	1.00	0.19	0.19	0.19	0.04	0.27	0.27
Sat Flow, veh/h	1810	3353	225	1810	3526	1585	608	199	665	1795	446	1231
Grp Volume(v), veh/h	148	642	662	57	732	82	259	0	0	92	0	143
Grp Sat Flow(s),veh/h/ln	1810	1763	1815	1810	1763	1585	1473	0	0	1795	0	1677
Q Serve(g_s), s	5.5	37.3	37.4	2.1	0.0	0.0	26.6	0.0	0.0	5.9	0.0	10.9
Cycle Q Clear(g_c), s	5.5	37.3	37.4	2.1	0.0	0.0	27.6	0.0	0.0	5.9	0.0	10.9
Prop In Lane	1.00		0.12	1.00		1.00	0.43		0.45	1.00		0.73
Lane Grp Cap(c), veh/h	518	1045	1076	251	2005	901	314	0	0	286	0	447
V/C Ratio(X)	0.29	0.61	0.62	0.23	0.37	0.09	0.82	0.00	0.00	0.32	0.00	0.32
Avail Cap(c_a), veh/h	543	1045	1076	309	2005	901	395	0	0	286	0	540
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	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	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.9	20.9	20.9	16.9	0.0	0.0	63.3	0.0	0.0	48.6	0.0	47.0
Incr Delay (d2), s/veh	0.3	2.7	2.6	0.5	0.5	0.2	10.8	0.0	0.0	0.6	0.0	0.4
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	2.2	15.5	15.9	0.8	0.1	0.1	11.3	0.0	0.0	3.0	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.2	23.6	23.5	17.4	0.5	0.2	74.1	0.0	0.0	49.2	0.0	47.4
LnGrp LOS	B	C	C	B	A	A	E	A	A	D	A	D
Approach Vol, veh/h	1452				871				259		235	
Approach Delay, s/veh	22.5				1.6				74.1		48.1	
Approach LOS	C				A				E		D	
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.7	97.1		49.2	9.9	100.9	12.0	37.2				
Change Period (Y+Rc), s	* 6.2	6.1		6.5	* 5.3	6.1	6.1	6.5				
Max Green Setting (Gmax), s	* 9.8	79.9		51.5	* 9.7	80.9	5.9	39.5				
Max Q Clear Time (g_c+I1), s	7.5	2.0		12.9	4.1	39.4	7.9	29.6				
Green Ext Time (p_c), s	0.1	12.8		0.9	0.0	22.1	0.0	1.1				

Intersection Summary

HCM 6th Ctrl Delay 22.9

HCM 6th LOS C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.